

A Message to Parts and Equipment Makers



Charles S. Davis

from the President of A. P. E. M. regarding their code

PRESIDENT ROOSEVELT has approved formally the Master Code of the automotive parts and equipment industry as presented by A.P.E.M.

This approval has authoritatively established the definition and status of our industry, and justifies our independent determination of maximum hours and minimum wages, for which principle A.P.E.M. stood firmly throughout the code negotiations. It is now the duty of every member of the industry to study carefully the provisions of the Master Code, an official copy of which will shortly be mailed to all industry members, and, if he has not already done so, to set his own house in order in compliance with the labor provisions.

Thereafter it will be the privilege of each member of the industry to join with all other members of his Product Group, that is with his competitors, to form a group association and to agree on a supplementary Product Group Code with the purpose of correcting, under the law, subversive trade practices and other abuses that may have been in the past a serious detriment to his business.

The Master Code of A.P.E.M. may in a sense be considered as an expression of the obligations of members of our industry under the National Recovery Act. The supplementary Product Group Codes will provide for the privileges of the members in their effort to improve certain conditions in the conduct of their business.

The officers of A.P.E.M. are prepared to give any help desired by members of the industry in the organization of Product Groups and in the formulation of supplementary codes.

This help will be extended promptly upon communication with the headquarters office of A.P.E.M., Room 3-158, General Motors Building, Detroit. Also, the Code Authority Committee of A.P.E.M., as constituted by the provisions of the Master Code, is prepared to act jointly with representatives of Product Group organizations, in presenting the proposed Product Group Codes for approval by the Administration at Washington.

I would again urge all members of the industry to respond promptly to calls for organization of the Product Group with which they should be affiliated, bearing in mind that they will be under the obligations of the Master Code from its effective date, November 18, and that they cannot legally obtain the direct benefits of group cooperation until a supplementary Product Group Code has been adopted and approved.

CHARLES S. DAVIS,
President, A. P. E. M.

The approved code appears on the next page.

Code of Fair Competition for the Automotive Parts and

(Effective November 18, 1933)

ARTICLE I—PURPOSE

To effectuate the policies of Title I of the National Industrial Recovery Act, the following provisions are submitted as a Code of Fair Competition for the Automotive Parts and Equipment Manufacturing Industry, and, upon approval by the President, shall be the standard of fair competition for this Industry.

ARTICLE II—DEFINITIONS AND DIVISIONS OF INDUSTRY

The term "Industry" as used herein is defined to mean the business of the production and/or manufacture of automotive parts and/or equipment, consisting of automotive original equipment, automotive replacement parts, automotive accessories, automotive shop equipment, automotive service tools, automotive chemical specialties automotive electrical products, internal-combustion engines excepting aircraft engines, such other allied products as are natural affiliates, including industrial, marine, and aircraft parts, units, and/or equipment, which are or have parts kindred to this automotive parts and/or equipment Industry, excepting, however, the production and/or manufacture of such articles when produced or manufactured by a manufacturer for use exclusively in his own finished product, and excepting the business of manufacturing and/or producing rubber tires and tubes and other rubber products included in the Code or Codes of Fair Competition for the Rubber Industry, and excepting the products included in the Code of Fair Competition for the Electric Storage and Wet Primary Battery Industry.

The term "member of this Industry" as used herein means all producers and/or manufacturers engaged in the production and/or manufacture of the products of this Industry.

The term "member of the Code" as used herein means any "member of this Industry" who assents to this Code.

The term "employees" as used herein means all persons employed in the conduct of the "Industry" as defined herein.

The term "employers" as used herein means all members of the "Industry" by whom such "employees" are employed.

The term "A.P.E.M." as used herein means Automotive Parts and Equipment Manufacturers, Inc., a trade association incorporated under the laws of the State of Illinois and having its headquarters' office at Detroit, Michigan, in which corporation there is no entrance or initiation fee and no inequitable restrictions are placed upon membership.

The term "the President" as used herein means the President of the United States.

The term "the Act" as used herein means the National Industrial Recovery Act as approved by the President on June 16, 1933.

The term "the Administrator" as used herein means the Administrator appointed by the President under the Act and at the time in office.

The term "effective date" as used herein means the tenth day after this Code shall have been approved by the President of the United States.

The term "expiration date" as used herein means the expiration date of Title I of the Act.

This Industry may be organized into administrative units based upon Divisions and Product Groups within the Industry which have been or may hereafter be established under A.P.E.M. Such Divisions or Product Groups may adopt, sub-

ject to the approval of the President, their own supplemental Codes of Fair Trade Practice, but nothing inconsistent with this Code shall be contained therein.

It is contemplated that each Division and each Product Group may in their own supplemental codes establish administrative committees and be independent and self-governing in respect to all conditions and problems relating exclusively to said Division or Product Group, except that each Division and each Product Group shall remain bound by this Code.

The following divisions of the products of the members of this Industry have been established under A.P.E.M.

(1) **Original Equipment.**—Products of this "Industry" sold to manufacturers and included by them as standard or optional equipment in their products.

(2) **Replacement Parts.**—Service or replacement parts.

(3) **Accessories.**—Automotive parts or equipment not usually included by the manufacturer to whom sold as "standard equipment" in the sale by such manufacturer of his products and usually sold to manufacturers or others as additional to "standard equipment."

(4) **Shop Equipment.**—Automotive machine tools and automotive apparatus designed for and used in the maintenance or repair of a motor, industrial, marine, or aircraft vehicle or internal-combustion engine and usually sold for use in reconditioning same.

(5) **Service Tools.**—Automotive small hand tools designed especially for or used either in conjunction with shop-equipment tools or apparatus or in the maintenance, repair, or adjustment of a motor, industrial, marine, or aircraft vehicle or internal-combustion engine.

(6) **Chemical Specialties.**—Automotive chemical specialties used chiefly in the operation, maintenance, or repair of a motor, industrial, marine, or aircraft vehicle, including auto polishes (both liquid and wax), top dressings, retouching enamels, radiator cleaners and stop-leaks, antifreeze solutions, valve-grinding compounds, and other kindred automotive specialties.

(7) **Automotive Electrical Products.**—Automotive electrical products sold as original equipment, replacement parts, or accessories for motor, industrial, marine, or aircraft vehicles and internal-combustion engines.

(8) **Internal-Combustion Engines.**—Internal-combustion engines except aircraft engines.

(9) Other divisions may be established by the Board of Directors of A.P.E.M., subject to the approval of the Administrator.

ARTICLE III—HOURS

(1) No employee engaged in the processing of products of this Industry, and in labor operations directly incident thereto, shall work or be permitted to work in excess of 40 hours per week, averaged over each six months' period from the effective date, provided, however, that such employees may be employed not more than 6 days or 48 hours in any one week, and employees engaged in the preparation, care, and maintenance of plant, machinery, and facilities of and for production and in plant protection, shall be exempt from the weekly limitations above provided, but the hours of employment of any such exempted employees shall not exceed 42 hours per week averaged on an annual basis.

(2) No office, salaried, or other employee, not covered by paragraph (1) of

this Article, receiving less than \$35.00 per week, shall work or be permitted to work more than 6 days or 48 hours in any one week and not more than an average of 40 hours per week for each six months' period from the effective date.

(3) Employees engaged in an executive, managerial, or supervisory capacity who receive \$35.00 per week or more; employees of the kinds covered by Section (2) of this Article who receive \$35.00 per week or more, and outside salespeople shall not be subject to any hourly limitations.

(4) No employee shall work or be permitted to work for a total number of hours in excess of the maximums herein prescribed, whether employed by one or more employers.

ARTICLE IV—WAGES

(1) The minimum wage that shall be paid by any employer to any employee engaged in the processing of the products of this Industry and in any labor operations directly incident thereto shall be at the rate of 40c. per hour for male employees and at the rate of 35c. per hour for female employees, subject to the following exceptions:

(a) If the rate per hour paid for the same class of work on July 15, 1929, was less than the above specified minimums, the rate per hour paid shall be not less than the rate per hour paid on July 15, 1929, but in no event shall the minimum rate per hour paid to either male or female employees be less than 87½ per cent of the above specified minimum rates; provided, however, that in the states of North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Arkansas, Tennessee, and such other states as may be excepted with the approval of the Administrator, the rate per hour paid to either male or female employees shall not be less than 80 per cent of the above specified minimum rates.

(b) Learners and apprentices for a period of not to exceed three months may be paid not less than 80 per cent of the minimum rates of wages above specified or determined in the manner above provided, but in the case of any employer the total number of such learners and apprentices in any calendar month shall not exceed 5 per cent of the employees engaged in the processing of the products of this Industry and in labor operations directly incident thereto.

(c) Where female employees do the same work or perform the same duties as male employees, they shall be paid the same rate of pay as male employees are paid for doing such work or performing such duties.

(2) The minimum wage that shall be paid by any employer to all other employees, except commission sales people, shall be at the rate of \$15.00 per week; provided, however, that learners and apprentices may be paid not less than 80 per cent of such minimum rate of wage for a period of three months, but in the case of any employer the total number of such learners and apprentices shall not exceed in any calendar month 5 per cent of the total number of employees covered by the provisions of this paragraph (2).

(3) Equitable adjustment in all pay schedules of factory employees above the minimums shall be made not later than 30 days from the effective date by any employers who have not heretofore made such adjustments, and the first monthly reports of wages required to be filed under this Code shall contain all wage increases made since May 1, 1933.

(4) The foregoing provisions establish minimum rates of wages, regardless of whether the employee is compensated on the basis of time rate or piece rate or otherwise.

(5) Employers shall not reclassify employees falsely, i.e., contrary to fact with

Equipment Industry as Approved

reference to work performed, with the intention of defeating the purposes of the Act.

(6) It is understood, however, that persons whose earning capacity is limited because of age or physical or mental handicap are not included in the above wage provisions except that they shall in no case be paid less than 80 per cent of the above minimums, and provided that the total number of such employees shall not exceed five employees in plants having less than 100 employees; nor more than 5 per cent of the total number of employees in such plants employing 100 or more.

ARTICLE V—CHILD LABOR

No employer in this Industry shall employ any person under sixteen years of age.

ARTICLE VI—ADMINISTRATION

A.—Organization and Powers

*(1) The Board of Directors of A.P.E.M. is hereby designated the Code Authority to assist the Administrator in the administration of this Code of Fair Competition and to formulate, with the approval of the President, such further code provisions as may be deemed necessary to insure fair competition and to effectuate in this Industry the purposes of the Act, provided that no inequitable restrictions upon membership in A.P.E.M. shall at any time be imposed.

(2) The Code Authority is hereby designated the agency to conduct communications and conferences with the Administrator concerning the Code of this Industry or any supplemental codes of the Divisions or Product Groups or any provisions thereof.

(3) With a view to keeping the Administrator informed as to the observance or nonobservance of this Code and as to whether appropriate steps are being taken to effectuate the purposes of the Act, each member of this Industry shall furnish certified reports to the Code Authority when and in such form as the Code Authority shall, subject to the approval of the Administrator, prescribe and permit a disinterested agency designated by the Code Authority to make such examinations of the records of each member of this Industry as may, subject to the approval of the Administrator, be deemed necessary for the purpose of verifying the accuracy of such reports.

(4) The President or the Administrator may designate a representative to participate in the conferences of the Code Authority with respect to the application of this Code, and such representative shall receive such notice of meetings as is given to members of the Code Authority and shall have access to all data and statistics collected by the Code Authority as hereinabove provided. The Code Authority shall hold itself in readiness to assist the Administrator and to meet with the Administrator's representative from time to time as requested, to consider and study any suggestions or proposals presented upon behalf of the Administrator or any member of the Industry regarding the operation, observance or administration of this Code.

(5) Any and all information with respect to sales volume, costs, and other details of operations as may be furnished by the members of the Industry to the properly constituted officers, committees, or representatives of A.P.E.M. or its Divisions or Product Groups shall be considered confidential and shall not be supplied or made available to others, except to the duly appointed and constituted representatives of the President.

*A.P.E.M. will furnish posters to all members to cover this clause previous to the effective date of the Code.

(6) In addition to information required to be submitted under this Code, there shall be furnished to government agencies such statistical information as the Administrator may deem necessary for the purposes recited in Section 3 (a) of the Act.

B.—Participation

Each member of the Code shall be entitled to participate in the activities of the Code Authority to the same extent as a member of A.P.E.M. Each member of the Code shall contribute his proportionate share toward a reasonable cost of preparation and administration of the Code, including the cost of the assembly and analysis of such reports and data as may be required under the Code and the cost of the maintenance of the Code Authority and its activities, either by becoming a member of the A.P.E.M. or by paying to A.P.E.M. his equitable and proportionate share of the expense of administration as determined by the Code Authority subject to the approval of the Administrator.

C.—Trade Practices

(1) It shall be unfair competition for any member of this Industry to sell or exchange in commerce within the continental boundaries of the United States of America any product of his manufacture at a price or upon such terms or conditions as will result in the customer paying for the goods received less than the cost to the seller, except under such special conditions as may be adopted by a Product Group in a supplemental code approved by the President.

(a) Cash or trade discounts, freight, express, cartage, or other delivery expenses allowed from invoice price shall be deducted therefrom in determining the net sales price.

(b) Each Product Group shall adopt, within such period as may be determined by the Code Authority, a definition of cost, methods of costing and accounting, and provisions for the administration and enforcement of the foregoing prohibition, subject to the approval of the Administrator.

(c) Where a member of this Industry produces more than one line of products, each line shall be considered a separate unit for purposes of ascertaining costs, and expenses of all kinds shall be properly and fairly allocated to the several lines.

(2) Nothing in this Code shall be interpreted to prevent the sale of dropped lines or surplus stock, or inventories which must be converted into cash to meet financial needs, at such prices as are necessary to move such merchandise, provided that after the approval of supplemental codes for the several Divisions or Product Groups all such stocks shall first be reported to the administrative committees of the proper Product Groups who shall in turn report to the administrative committees of all Divisions whose Groups may be affected by such action.

(3) The defamation of competitors by falsely imputing to them dishonorable conduct, inability to perform contracts, questionable credit standing, or by other misrepresentations to mislead and deceive purchasers or prospective purchasers, is unfair competition.

(4) Maliciously enticing away the employees of competitors with the purpose and effect of hampering, injuring, or embarrassing competitors in their business is unfair competition.

(5) The dating of an invoice other than the date of the shipment and the withholding from, or inserting in the invoice, facts which make the invoice a false record, wholly or in part, of the transaction represented on the face thereof, and/or the payment or allowance of secret rebates, refunds, credits, unearned

discounts, whether in the form of money or otherwise, is unfair competition.

(6) Disparagement of the goods of competitors to mislead or deceive purchasers or prospective purchasers is unfair competition.

(7) Selling or offering to sell any product with intent to deceive purchasers or prospective purchasers is unfair competition.

ARTICLE VII—GENERAL

(1) As required by Section 7 (a) of Title I of the Act, the following provisions are conditions of this Code:

(a) "That employees shall have the right to organize and bargain collectively through representatives of their own choosing, and shall be free from the interference, restraint, or coercion of employers of labor, or their agents, in the designation of such representatives or in self-organization or in other concerted activities for the purpose of collective bargaining or other mutual aid or protection;

(b) "That no employee and no one seeking employment shall be required as a condition of employment to join any company union or to refrain from joining, organizing, or assisting a labor organization of his own choosing; and

(c) "That employers shall comply with the maximum hours of labor, minimum rates of pay, and other conditions of employment approved or prescribed by the President."

(2) Within each State this Code shall not supersede any laws of such State imposing more stringent requirements regulating the age of employees, wages, hours of work, or health, fire, or general working conditions than under this Code.

(3) Such of the provisions of this Code as are not required to be included herein by the Act may, with the approval of the President, be modified or eliminated by the Board of Directors of the A.P.E.M. if it appear that the public needs are not being served thereby and as changes in circumstances or experience may indicate.

(4) It is contemplated that from time to time supplementary provisions to this Code or supplemental codes will be submitted for the approval of the President to prevent unfair competition in price and other unfair and destructive competitive practices and to effectuate the purposes of the Act and which shall not conflict with the provisions hereof.

(5) As required by Section 10 (b) of Title I of the Act, the following provision is contained in this Code: The President may from time to time cancel or modify any order, approval, license, rule, or regulation issued under said Title.

(6) No member of this Code shall be held to have consented to any modification thereof or to any provision or interpretation of the National Industrial Recovery Act if declared unconstitutional by the Supreme Court of the United States.

(7) No provision of this Code shall be so applied as to permit monopolies or monopolistic practices, or to eliminate, oppress, or discriminate against small enterprises.

*(8) Each employer shall post in conspicuous places, accessible to employees, the labor provisions of this Code.

(9) Violation by any member of this Industry of any provision of this Code is an act of unfair competition, and the offender shall be subject to the penalties imposed by the Act.

*The A.P.E.M. board of directors has delegated the following committee of six as the Code Authority to act in place of and by authority of the Board: Claire L. Barnes, C. P. Brewster, C. C. Carlton, C. S. Davis, J. H. Williams and C. E. Wilson.

Hayes Continuously Variable Now Offered Optionally on

A CONTINUOUSLY variable transmission which automatically gives ratios of engine to propeller shaft speeds of from 4 to 1 to an overdrive of 1 to 1.7 is now being offered as optional equipment on the British Austin Sixteen.

The device is known as the Hayes Self Selector and is the invention of Frank A. Hayes, Middletown, N. J. It is covered by numerous

U. S. patents, including 1,698,229 and 1,865,102. A number of American manufacturers are reported to have experimented with it, but so far as we know, Austin is the first car manufacturer to offer it to the public.

The controls include a clutch, which is used only in starting, and a lever to put the transmission in forward or reverse. In addition, there are two finger tip levers

above the steering wheel which can be adjusted to give various engine speeds for a given range of speed ratios or to limit the top ratio. These, however, need not be touched unless some other setting is desired.

In explaining the construction and functioning of this transmission we will first consider the double ball-thrust bearing as being the basis of the design. A bearing

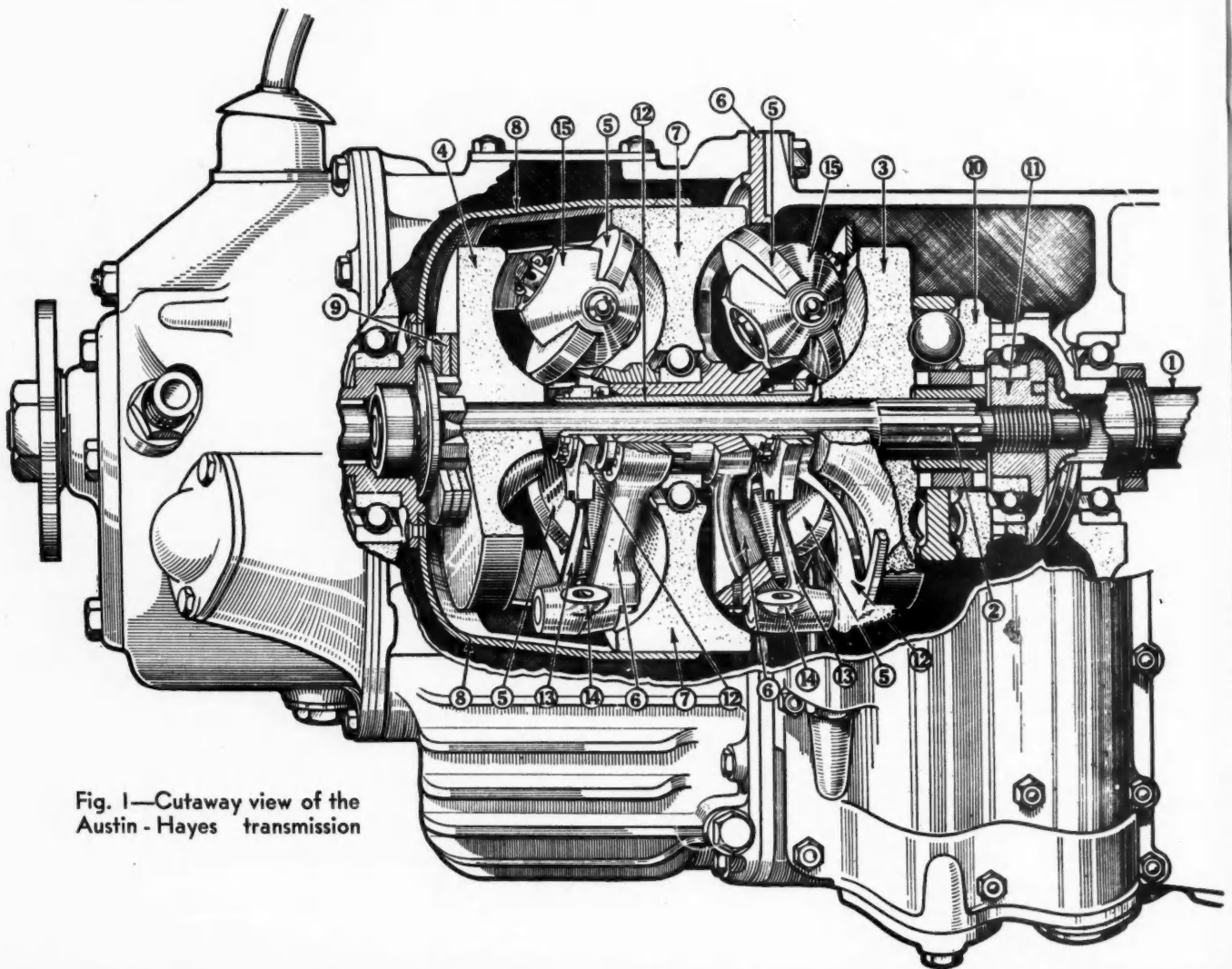


Fig. 1—Cutaway view of the Austin-Hayes transmission

Transmission

Austin Sixteen

by M. W. Bourdon
London Correspondent
Automotive Industries

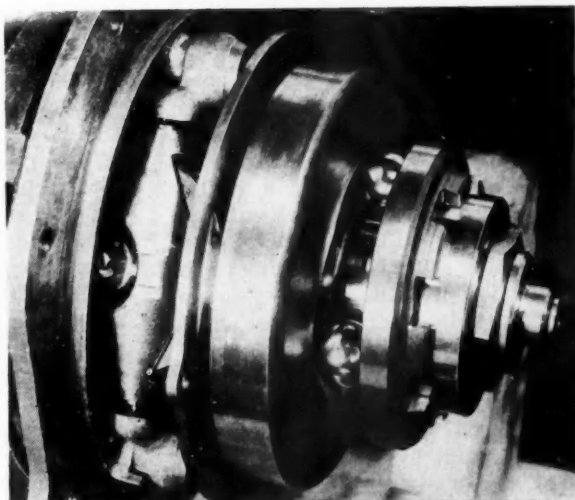
Provides infinite variation of ratio of engine and propeller shaft between 4 to 1 and overdrive of 1 to 1.7

of this type, it may be recalled, comprises two outer tracks or races and a double center race with, between them, two rows of balls in cages. If these cages are restrained from rotating and the races are free, the balls will transmit the concerted movement of the outer races to the center race. Each ball being restrained and traveling round the races but quite free to rotate on its own axis, translates a clockwise rotation of the outer races into anti-clockwise but otherwise equal rotation of the center race. The cages for the balls being anchored, rotation of the outer races in one direction will cause equal and opposite rotation of the center race. This is the very essence of the Hays transmission.

In Fig. 1 it will be seen that the curvature of the two outer races and the double center race has been increased so that they present toroidal surfaces. Rollers have taken the place of balls or, in other words, that part of the ball which has no contact with the races has been dispensed with. When the rollers are parallel with the axis of the races and able to rotate on their own axes, yet unable to travel round the races through being anchored to an outside object, the transmission from the two outer races to the double center race will be exactly the same as that described in respect of the double ball-thrust bearing.

As the rollers when in that position rotate on tracks of the same diameter on all races, the speeds of the outer and center races will be identical, although in opposite directions. If, however, the rollers are tilted a variation of speeds is

Fig. 2 — Ball clutch to provide supplement spring pressure of the rollers between races. Wedging action increases the pressure or loading of the rollers in proportion to the torque to be transmitted



secured, for the rollers are then driven by a small diameter of the outer races and transfer the drive to a large diameter of the center one. This is the means employed for varying the ratio. It is merely a matter of rocking or precessing the rollers to engage with the races on differing diameters.

Given a gradual form of control, an infinite variation of ratio is thus rendered possible between the limits of the angular movement of the rollers. This is very considerable, ranging from a low gear of approximately 4 to 1, to an overgear of 1 to 1.7, the engine then rotating once for every 1.7 revolutions of the propeller shaft. Apart from the ratios being infinitely variable, this is a much larger range than is provided by any normal gearbox and the high gear gives almost the same sensation as free-wheeling.

Referring again to Fig. 1 the drive is transmitted by the clutch shaft (1) through dogs to the driving shaft (2). Floating on this shaft are the two outer races (3 and 4), connected only by dogs for the drive. The steel rollers (5) are supported in the fixed roller assembly (6) bolted between the two outer casings. The assembly consists of two sets of three rollers which can rotate on their own axes and, being mounted in carriers, can rock to various ratio positions. These transmit the drive from the two steel outer races (3 and 4) to the steel double inner race (7) from which it is conveyed by the large drum (8) to the propeller shaft (or, for reverse, through suitable gears). As the transmission through the rollers and races reverses the direction of motion, the final drive in the rear axle has to be reversed.

To transmit any given power a certain pressure must exist between the rollers and races, otherwise slip would arise. The initial pressure is obtained by three spring washers (9) giving approximately 1400-lb. load on the rollers. Further pressure is provided by a loading device incorporated in the drive (Fig. 2). The clutch shaft is dogged to a floating torque ring (10) and the outer race (3), as previously mentioned, also floats, but engages by means of dogs with the drive shaft (2). Radial grooves in the opposing faces of the torque ring and the outer race form inclines for three steel balls carried between the two members (Fig. 2). These balls provide the drive by reason of their wedging action between the inclines. This action further serves to apply an end-thrust on the entire roller mechanism toward the rear outer race (4) which is supported by the spring washers (9) already mentioned.

As the driving torque increases, the balls increase their thrust so that the rollers, having a higher contact pressure, can transmit the heavier load without slipping. This device for loading the rollers in proportion to the torque to be transmitted is one of the most vital provisions in the design. Incidentally, the thrust of the outer race being resisted by the spring washers (9) and the thrust of the torque ring by the loading nut (11), the entire thrust is sustained within the driving shaft (2) without imposing any unbalanced end load on any other part of the mechanism. Further, as there are three rollers between each pair of races the consequent three-point contact ensures uniform pressure on each.

The contact pressure of the rollers renders it impracticable to change the ratio of the drive by directly rocking them, in view of the large effort required, the difficulty of moving all six rollers positively to exactly the same angle, and the slipping which would result from a sudden speed change. One of the most ingenious features of the Hayes transmission is the way in which this difficulty is overcome. By altering slightly the axial position of each roller it rolls of its own accord into a new path of contact. The sectional view of the transmission shows the control sleeve (12) which, by suitable levers, is linked to the hydraulic control unit. This sleeve rotates to move the lever (13). The three

rockers support the carriers (15) in which the rollers (5) are mounted. The roller carriers have ball ends to provide a universal mounting in the rocker arms.

This allows the rollers to rock to any ratio position. Rotation of the sleeve (12) transmitted to the main rocker levers causes the rollers to assume a new position, and this displacement of the roller axes initiates precession of the rollers which sends them to their new ratio position over a spiral (instead of their normal circumferential) path on the races. Thus without involving any appreciable effort the rollers can be readily induced to take any ratio position required.

Ratio Can Be Automatically Changed

It will be realized at this point that having a mechanism capable of providing an infinitely gradual change of ratio within prescribed limits, and requiring only nominal effort by way of control, an automatic change of ratio can be readily devised. The hydraulic control unit comprises a pump, driven at engine speed, to supply oil under pressure to the control cylinder and above the control pistons. The oil pressure, rising with the engine speed, imparts movement to the piston which is communicated to the control sleeve to initiate precession of the rollers, which then move to a higher ratio. But this influence exerted by the engine to increase the speed ratio is balanced by a reaction exerted on the roller control mechanism by the tractive resistance from the road wheels. In

other words, the driven race in trying to resist the drive imparted by the rollers exerts a drag on each roller which is communicated to the rockers in which it is carried. This drag tends to give a lower ratio roller precession, but it is also communicated to the control sleeve and finally to the piston. Thus it serves to balance the natural tendency of the engine, as its speed increases, to give a higher ratio.

These balancing factors enable the gear to operate entirely automatically, finding new ratios to balance the variations of tractive resistance and engine speed, while giving the desired road performance. The driver can vary the oil pressure above the control piston for any given engine speed merely by regulating the escape of oil through a leak valve. This has the effect of increasing or decreasing the engine speed to balance the tractive resistance arising during running, and so serves to vary the performance of the car. Another control, which alters the position of a port uncovered by the movement of the piston toward the higher ratios, serves to limit the top ratio by limiting the piston movement. The two controls mentioned above are operated from finger-tip levers above the steering wheel. That to the right controls the leak valve to give various engine speeds for a given range of speed ratios; that to the left limits the top ratio by the means already mentioned. These, once set for automatic functioning for a desired maximum top ratio, need not be touched unless some other setting is desired. There is also a transmission lever for forward and reverse, and the normal

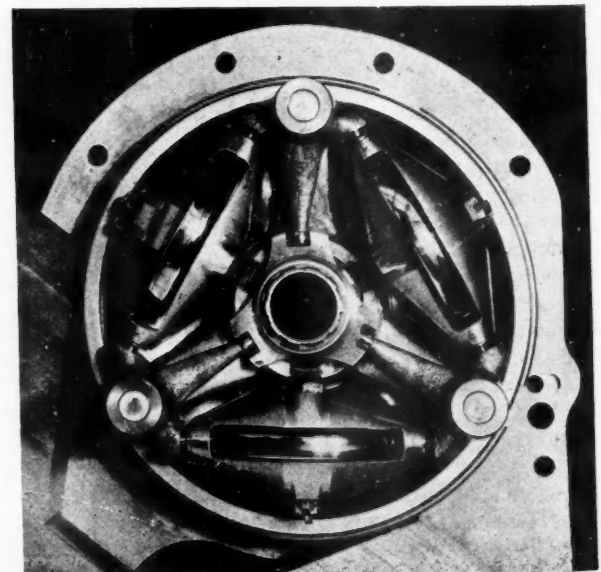


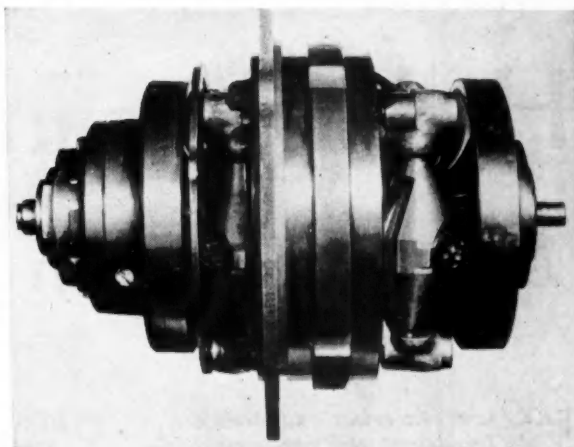
Fig. 3—Position of rollers in direct drive (1 to 1 ratio between the races)

clutch just to provide gradual take-up of the drive when starting away.

When the car is in motion it requires no control other than of direction and speed. On hills, as the tractive resistance increases the ratio drops and at a virtually constant engine speed a balance of power output and resistance is achieved, though by setting the ratio high the engine speed can, if desired, be made to vary almost as the road speed as with an orthodox transmission. On down grades, due to the reversed reaction exerted by the over-drive on the roller controls, the rollers assume their over-speed position (1.7 to 1) to provide, without any disengagement of the drive, all the advantages associated with the free-wheel.

I have driven an Austin Sixteen with this transmission and found it a most gratifying experience. The transmission is absolutely silent under all conditions and operates precisely as claimed and there is no lost motion. By use of the steering wheel controls the driver can secure any special type of performance he desires—violent acceleration, fast hill-climbing, high-gear crawling, high speed at relatively low engine speed and so on, while the leak valve control serves as an engine speed governor when set in the "retard" position. For average performance these levers can be ignored and the car driven solely on the accelerator.

Fig. 4—Complete assembly with rollers in low ratio position (4 to 1 between races)



The ratio control will be set to prevent the complete cut-off—in other words, to give just short of a solid drive at the maximum over-speed ratio ($\frac{5.1}{1.7}$ on the Austin), and this results in its being impossible to stall the engine.

As regards efficiency, no information is yet available; it is high, without doubt, but it is evident by the performance of the car that even if there is a lower efficiency in transmission than with gearing the overall efficiency from fuel tank to rear is higher because the engine can be set always to operate at somewhere near its most economical and efficient speed. What

is lost in efficiency in the transmission is more than made up in the increased efficiency of the engine. That is quite evident in the running of the Austin Sixteen which has a far better performance with this transmission than with a four-speed gearbox.

The Hayes transmission is at present heavier than the corresponding gearbox, but this disparity will doubtless be reduced if not eliminated, while although Austin is asking £40 extra for the car with the new transmission, the manufacturing costs in quantity production are expected to be no more, or very little more, than those of the gearbox.

P. M. Heldt Publishes 8th Edition of Automotive Engines

THE eighth edition of P. M. Heldt's book on internal combustion engines has just come off the press. Previous editions were called "The Gasoline Engine," but the latest carries the more comprehensive title of "Automotive Engines."

The outstanding feature of the latest edition is a new chapter on torsional crankshaft vibration and vibration dampers. In this is developed a method for determining the critical speeds of torsional vibration from design characteristics. Such predetermination is of great importance in airplane and marine engines which are held down to a definite speed by the propeller load, but of lesser importance in motor vehicle engines because engine speed is subject to operator-control.

The importance of critical speeds in air service was strikingly illustrated by the case of the Graf Zeppelin when she broke one crankshaft after another on her first unsuccessful trip across the Atlantic. It so happened that the normal operating speed of the engines was near a critical speed of the crankshaft assembly with the result that there was constant torsional vibration that added greatly to the stresses on the crankshafts, eventually resulting in failure.

The chapter on calculation of bearing loads has been entirely revised and now includes tables by the use of which the loads on any bearing of any internal combustion engine under full-load conditions can be calculated quickly.

The last previous edition ap-

peared in 1926 so the revisions cover seven years of progress in automobile design and production. The extent of the revision may be judged from the fact that more than one hundred new illustrations are included in the volume. Moreover, while those who are playing a role in the drama of automotive progress may feel that the industry advances at a laggard pace, just thumbing through the pages of the latest edition of Mr. Heldt's book indicates that substantial progress has been made in the last seven years. As actors in the drama, we are too close to the march of events to see them in proper perspective and thus to appreciate their magnitude.

The publisher is P. M. Heldt, Nyack, N. Y., and the price is \$6.

Highlights and Sidelights

on the 25-Year History of

THE first American automobile sold for export and presumably the first American car sold for a stated price, was an Oldsmobile steamer of the early nineties, which used a flash type boiler. The buyer was the Francis Times Co. of Bombay, India, and the sale resulted from an article in the Scientific American.

* * *

A FIRE which consumed the Olds plant, burned everything but the first and only curved-dash Olds. This was rescued and served as the model for others. Indirectly the fire brought the Lelands into the automobile business. R. E. Olds turned to Leland & Faulconer for motors for the Olds runabout—that led eventually to the Cadillac.

* * *

AT the first meeting of the board of directors of the Olds Motor Vehicle Company, R. E. Olds was empowered to "build one perfect carriage." This was amended to read, "build one carriage in as nearly perfect a manner as possible."

* * *

IN 1901 Olds was the first gasoline car used in any postal service in the world. In 1903 it was the first American car to have covered a mile in less than a minute.

DAVID DUNBAR BUICK developed a method of fixing porcelain on metal and might have become the Bathroom King had he not turned to automobiles. The forerunner of the Buick Motor Co. was the Buick Auto-Vim & Power Co., established in 1901 by Mr. Buick and Charles Sherwood. Development of the "valve-in-head" motor began in 1902.

* * *

WILLIAM C. DURANT made his entrance into the automobile industry by way of Buick. He became president of the company in 1904, built it to prominence rapidly and four years later used it as the foundation for General Motors.

* * *

CHARLES W. NASH was once head of the Buick Motor Company. He had as his works manager Walter P. Chrysler.

* * *

CADILLAC was an outgrowth of the Detroit Automobile Co., formed in 1899 to manufacture automobiles. Henry Ford was chief of the mechanical department. A merger of the Cadillac Automobile Co. and the Leland & Faulconer Co. created the Cadillac Motor Car Co. which became a part of General Motors in 1909.

* * *

MR. DURANT bought Cadillac for \$4,500,000 in cash. This transaction was the largest negotiated in Detroit up to that time.

THE General Motors Company of New Jersey was incorporated for \$2,000 on Sept. 16, 1908. Twelve days later the authorized capital was raised to \$12,500,000. The assets of the corporation at the end of 1932 had reached the sum of \$1,115,228,641.

* * *

THE two-cycle Elmore, the friction drive Cartercar, the Welch, Welch-Detroit and Rainier, all became members of the General Motors family just after the corporation was formed. Later the companies were liquidated or consolidated with other units.

* * *

GENERAL MOTORS almost bought the Ford Motor Company. This was in 1909. Directors authorized the purchase for \$8,000,000. Terms were \$2,000,000 down and the balance in one and two years. Ford wanted cash, General Motors didn't have it and no banker could be found who thought the Ford company worth the risk.

* * *

MR. DURANT lost control of General Motors in 1910. Five years later he was back in the saddle. This is how he did it. Organized the Little Motor Car Co. in 1911. Backed Louis Chevrolet in the designing of a car. Organized the Chevrolet Motor Company of Michigan in 1911. Organized the Mason Motor Co. to build engines for both the Little and Chevrolet cars. The first Little was designed to compete with Ford; the Chevrolet was a bigger car. Chevrolet expanded rapidly and the Chevrolet Motor Company of Delaware was formed. Stock in this new company was offered in exchange for stock in General Motors and Chevrolet got control of General Motors in 1915. Final union between General Motors and Chevrolet was not effected until 1918.

General Motors

GENERAL MOTORS ceased to be a holding company and became an operating company in 1917.

* * *

RANSOM E. OLDS built his first automobile, a three-wheeled steamer, in 1887. In 1892 he bought his father's interest in their machine shop on River Street, Lansing, Mich., and incorporated the Olds Gasoline Engine Works for \$30,000.

* * *

THE late J. Amory Haskell, once a competitor of the du Ponts in explosives manufacture, and later president of General Motors Export Company, was chairman of the research committee which studied living conditions and other industrial problems connected with General Motors plants. After one of the most comprehensive social studies ever made by an American corporation, the committee wrote a report which inaugurated General Motors' housing programs in Detroit, Flint, Pontiac, and Lansing.

* * *

BOB BURMAN and the Chevrolet brothers—Louis and Arthur—formed one of America's most famous racing teams when they drove "Buick Bugs." In 1911 Burman established two straight-away records regardless of class: 50 miles in 35 minutes 52.3 seconds and 20 miles in 13 minutes 11.92 seconds. Both records made at Jacksonville, Fla., stood for more than ten years.

* * *

THE self-starter owes a lot to a backfiring Cadillac. The machine's crank seriously injured a

Did You Know That—

Six million dollars cash was all that once stood between General Motors and ownership of the Ford Motor Co.?

David Dunbar Buick nearly became the "Bathroom King"?

The destruction of the Olds plant by fire brought the Lelands into the automobile business?

R. E. Olds was empowered to build "one perfect carriage"?

R. D. Chapin was refused admittance at the front door of a New York hotel?

Flint residents say that C. W. Nash mowed a lawn so well that Mr. Durant brought him into the automobile business?

friend of Henry M. Leland, founder of Cadillac. Mr. Leland was grieved and gave Charles F. Kettering a chance to demonstrate the Delco starting system, the first in general use.

* * *

ALEXANDER WINTON, whose Winton Engine Corporation is now in the General Motors fold, was a colorful figure of early automobile history. In 1899 he drove from Cleveland to New York City—707 miles as he drove—in 47 hours running time. In 1900 he represented the Automobile Club of America in the Gordon Bennett cup race from Paris to Bordeaux, France. Ripping off a tire in rounding a corner, he drove 25 miles on the rim before he would quit the race. In 1902 he set the world's mile track record at Cleveland—time, 1 minute 2¼ seconds.

BECAUSE the owner of a Cadillac used his machine to light his summer cottage during an emergency, Delco-Light for rural residents was developed. The Cadillac-owner wrote for a complete Cadillac ignition and lighting system for domestic use, furnishing Charles F. Kettering with an idea for Delco-Light.

* * *

ROY D. CHAPIN, ex-Secretary of Commerce, was refused admittance at the front door of a New York hotel in 1901 after his historic Oldsmobile trip from Detroit to New York. Arriving with clothes rumpled by a 7½-day motor trip over winter roads, he drove to the hotel where his chief, Ransom E. Olds, anxiously awaited him. The doorman took a look at the future Secretary of Commerce and sent him to the servant's entrance.

(Turn to next page please)

How General Motors Became Financially Great

Year Ended Dec. 31	Net Sales	Net Income Available for Dividends	Preferred Dividends	Balance Available for Common Stock	Cash Dividends Paid on Common Stock	% Income Disbursed in Cash Divi- dends on Preferred and Common Stocks	Income Reinvested in the Business
1909†	\$29,029,875	\$9,114,498	\$417,621	\$8,696,877	.....	4.58%	\$8,696,877
1910†	49,430,179	10,225,367	642,947	9,582,420	.....	6.29%	9,582,420
1911¶	42,733,303	3,316,251	842,074	2,474,177	.....	25.39%	2,474,177
1912‡	64,744,496	3,896,293	1,040,211	2,856,082	.....	26.70%	2,856,082
1913‡	85,603,920	7,459,471	1,048,534	6,410,937	.....	14.06%	6,410,937
1914‡	85,373,303	7,249,734	1,048,679	6,201,055	.....	14.47%	6,201,055
1915‡	94,424,841	14,457,803	1,048,964	13,408,839	.....	7.26%	13,408,839
1916‡	156,900,296	28,789,560	1,048,964	27,740,596	\$10,730,159	40.91%	17,010,437
1917‡	172,677,499	24,780,916	1,048,964	23,731,952	7,430,302	34.22%	16,301,650
1917§	96,295,741	14,294,482	491,890	13,802,592	2,294,199	19.49%	11,508,393
1918	269,796,829	14,825,530	1,920,467	12,905,063	11,237,310	88.75%	1,667,753
1919	509,676,694	60,005,484	4,212,513	55,792,971	17,324,541	35.89%	38,468,430
1920	567,320,603	37,750,375	5,620,426	32,129,949	17,893,289	62.29%	14,236,660
1921	304,487,243	*38,680,770	6,310,010	*44,990,780	20,468,276	.....	*65,459,056
1922	463,706,733	54,474,493	6,429,228	48,045,265	10,177,117	30.48%	37,868,148
1923	698,038,947	72,008,955	6,887,371	65,121,584	24,772,026	43.97%	40,349,558
1924	568,007,459	51,623,490	7,272,637	44,350,853	25,030,632	62.57%	19,320,221
1925	734,592,592	116,016,277	7,639,991	108,376,286	61,935,221	59.97%	46,441,035
1926	1,058,153,338	186,231,182	7,645,287	178,585,895	103,930,993	59.91%	74,654,902
1927	1,269,519,673	235,104,826	9,109,330	225,995,496	134,836,081	61.23%	91,159,415
1928	1,459,762,906	276,468,108	9,404,756	267,063,352	165,300,002	63.19%	191,763,350
1929	1,504,404,472	248,282,268	9,478,681	238,803,587	156,600,007	66.89%	82,203,580
1930	983,375,137	151,098,992	9,538,660	141,560,332	130,500,002	92.68%	11,060,330
1931	808,840,723	96,877,107	9,375,899	87,501,208	130,500,001	144.38%	*42,998,793
1932	432,311,868	164,979	9,206,387	*9,041,408	53,993,330	.....	*63,034,738
Total	\$12,509,208,670	\$1,685,835,671	\$118,730,491	\$1,567,105,180	\$1,084,953,488	71.40%	\$482,151,692

NOTES: † Fiscal years ended October 1. ¶ 10 months ended July 31, 1911. ‡ Years 1912-1917, inclusive, are fiscal years ended July 31. § 5 months ended December 31, 1917. * Deficit.

A. B. C. HARDY, formerly general manager of Chevrolet Motor Company, signed Chevrolet stock certificates until his wrist failed during W. C. Durant's dramatic campaign to acquire control of General Motors in 1915. Chevrolet certificates were exchanged for General Motors stock in the ratio of five to one. Mr. Hardy signed the certificates in secret at Chevrolet headquarters to prevent advance publicity on the Durant coup.

* * *

WHEN Fred J. and Charles T. Fisher incorporated Fisher Body Company in 1908, the project looked hopeless to many industrialists, who thought the country too shaken by the 1907 panic to risk new ventures. The Fishers demonstrated that "bad times" are best for those who have courage. They could rent real estate cheaply and get their pick of the labor market. The Fisher body group is now a part of General Motors.

* * *

THE World War led General Motors into the aviation field. The corporation's plants made more

than 2500 Liberty engines for airplanes during the war. More than 10,000 Liberties were on order from the government when the war ended. Realizing how rapidly the war had developed aviation, the corporation began considering its possibilities as a peace-time industry.

* * *

THE General Motors' dealer in Rangoon has a motto: "If you can't come to Watson's, Watson will come to you." In order to make good his slogan, the dealer recently chartered a steamer and a steel barge to exhibit cars to residents of thirty river towns inaccessible by road. Town criers broadcast news of the dealer's approach, whereupon the natives flocked into the towns to see the machines.

FLINT residents say Charles W. Nash mowed a lawn so well that W. C. Durant noticed his work, and started him on a career that took him to the presidency of General Motors Corporation.

* * *

THE late Harry H. Bassett, vice-president of General Motors, used to say that satisfying customers was not enough.

"If you are to prosper soundly," he would remark, "you must lay yourself out to satisfy also the men who make your product and the men who sell your product."

JUST AMONG OURSELVES

\$700 Airplanes For Everybody

IT is a comparatively easy task to design and turn out on a volume production scale a \$700 airplane, Eugene L. Vidal, new Director of Aeronautics of the Department of Commerce, says in a rather startling statement issued last week. "It would be a small, low-wing monoplane," he said, "would carry two passengers, be constructed of a new steel alloy, fitted with an eight-cylinder, small bore engine of about 4,000 r.p.m. and equipped with a geared propeller. The outstanding feature would be a landing speed of about 25 m.p.h. which would be brought about by 'air brakes' in the form of flaps. The cost of operating and maintaining a plane of this type would be less than that of an average priced automobile and it would not require 'superman' qualifications to fly it."

Survey to Find Customers

MR. VIDAL'S department is undertaking a survey of the 14,000 licensed pilots, 11,000 student pilots and 8,500 licensed mechanics in the United States to see how many of them would buy such a plane if it were made available in the near future. There are only 7,000 licensed aircraft in the country now. Mr. Vidal feels that "if an aircraft manufacturer knew he had a large market for a certain type of craft he would eagerly under-

take production in volume which would enable him to sell his product for a price around \$700 or even lower. All that is needed is some step which will bring producer and consumer together, with definite assurance to the industry that the market actually exists."

Who Will Build the Planes

EVIDENTLY Mr. Vidal believes that if every one of the 33,500 to whom his questionnaire is going evidenced a desire for such a plane, the quantity would be large enough to warrant the \$700 price about which he talks. Much would depend, it seems to us, on the number of companies among which the business was going to be split. Some airplane designers undoubtedly will be found disagreeing with Mr. Vidal about the ease of designing a \$700 plane, even if a national market for 10,000 were immediately available as a basis for the competitive selling of the numerous manufacturers. Other engineers certainly will be found agreeing with him. Mr. Vidal's own statement concludes:

"Leading aeronautical engineers have given assurances that such a craft can be constructed at the price mentioned. It will be produced if the pilots in the United States are interested, and we are now furnishing them with a means for making their interest a matter of record. If a favorable response does not follow, we will at least learn

what is retarding the development of private flying."

Certainly the results of this investigation will be awaited with real eagerness by everybody in the automotive field.

When It Is Not An Emergency

THE most pertinent statement we have ever heard of why an independent drive shaft brake is not an "emergency" brake was made by B. B. Bachman in a recent S.A.E. paper when he said:

"If a failure in the service brake occurs without the driver's knowledge until he needs to use the brake, the time lost in becoming aware of the failure and attempting to apply the brake is fatal if the need of the brake is imperative. If the failure occurs and the driver is aware of it so that a secondary system is needed to bring the vehicle to a place where repairs can be made, the driveshaft brake commonly used is less effective for the reason that it is operative only on two wheels in the first place; and second, on account of limitation in size and location, it has very much less thermal capacity.

"Therefore in one emergency it is inadequate because it cannot be brought into action quickly enough, and in the other it is limited in capacity.

"From these facts, it is obvious that under present conditions the word 'emergency' is a misnomer where applied to the auxiliary brake.

"... the best performance and maximum safety can be secured by providing wheel brakes properly proportioned to the size of the vehicle with two independent means of control arranged in such a way that the failure of any part of either control system will still leave operable brakes on at least two wheels."

—N.G.S.

Is Independent Suspension C

A critical survey of what automotive engineers think about the unconventional springing which is expected to feature a number of 1934 models

by Athel F. Denham

Field Editor,
Automotive Industries*

GUIDE types (Figs. 8 and 9) are suspensions in which the wheels are pivoted at the frame. When wheels are displaced, the king-pin slides up and down in a guide.

Of the two types shown, the one with the vertical king-pin seems to be the more desirable, since with it wheel displacements produce no changes in wheel track, wheel camber, or caster. With absence of gyroscopic couples therefore, absence of shimmy would be assumed. Shimmy has been experienced, however, possibly indicating that the theory of harmonic vibrations cannot be overlooked.

Hard steering at low speeds has been experienced with this design, probably because even a small king-pin caster angle produces a considerable lifting action. This is due to the fact that clearance considerations call for a large lever arm between the king-pin axis and the center of tire contact with the road.

The inclined king-pin type overcomes this defect. However, inclining the king-pin has the effect of even further lowering the instantaneous

center of the car for sideroll on curves (Fig. 8), increasing the centrifugal moment. This in turn increases the outward lean of the car and wheels on curves at high speeds, and therefore increases the steering-power requirements. Bearings and fitting of the guides present quite a problem, especially in view of the high transverse torque loads on the king-pin. The cost of guide-type suspensions is rather high.

Crank-Arm Types: (Fig. 10)

Crank-arm types have been incorporated on experimental cars in this country with such variations as semi-elliptic longitudinal springs, transverse semi-elliptics, and coil springs.

In general characteristics the system is similar in effect to guide types, in that a true rolling wheel for straight-ahead driving is obtained, there being no variations in either camber or track with wheel deflections. There is, however, a considerable change in king-pin caster with wheel deflections. This is probably responsible for the wicked low-speed shimmy experienced with some installations. Lengthening the crank arm reduces the variation, but introduces structural difficulties.

Part 2

Part 1 appeared in the November 11 issue of *Automotive Industries* on page 571

Clearance requirements call for considerable ingenuity in the layout of such a system on a large car, especially if coil springs are used. The system is subject to the same limitations as the guide types with reference to distance between the king-pin axis and the center of tire contact with the road. The amount of body roll and wheel lean on curves is the same as for guide types and transverse parallelograms, therefore giving the same increase in steering power requirements.

Crank-arm types permit a good steering geometry also, and are notable for absence of steering wheel kick if the king-pin is located close to the center of the wheel.

A characteristic of crank-arm types of suspensions when applied to front wheels is that under brake application the car will either nose down or up, depending on whether a long or short base crank arm is used, and whether you are going forward or back. If spring rates are reduced, this condition will be aggravated particularly in the case of the long-base type.

If crank-arm types are applied to both front and rear, on the other hand, the car can be made to squat when the brakes are applied, instead of nosing down. This, at least, would decrease the tendency for the passengers to be propelled forward, by eliminating the angular acceleration of the chassis and body. Whether or not these characteristics of crank-arm types under brake application are objectionable, is a matter of opinion. If necessary they can be overcome by the use of compensating torque arms.

The use of a short-base crank-arm suspension at the rear only, in combination with other types of front independent suspensions, has apparently produced no serious objections. The tendency under brake application to

*Concluding part of an S.A.E. paper presented before the Detroit Section on Nov. 6 and the Philadelphia Section on Nov. 8.

Cure for Front End Troubles?

pull the rear of the car down can be used to overcome the angular acceleration of the car due to the so-called forward shifting of the weight during deceleration.

Crank-arm types require exceptionally rigid frames, both torsionally and laterally, since side thrusts are transmitted directly to the frame. Rigidity requirements are probably higher than with most other designs of suspension systems, especially with long-base crank-arms.

Most European designs of crank-arm suspensions have been rejected as impracticable in this country, partly on the basis of high cost involved, partly because of the above considerations, and partly because of the complication of the European mechanisms. Some rather simple types have been successfully developed in this country, however.

Hinged Axles:

Hinged axles in effect are transverse crank-arm types. There is, at least theoretically, no variation in king-pin caster with wheel deflection, but instead there are considerable variations in camber. The shorter the crank-arm, the greater the variations, of course. For this reason, only the long-hinged axle type (Fig. 11) has

received any consideration for front ends.

The large camber changes accompanying vertical wheel displacement should set up large gyroscopic couples, producing shimmy. This expectation was borne out when the suspension system was installed on standard production automobiles. Unbalance of wheels was found to aggravate the shimmy. Tramp also has been experienced where frames had insufficient rigidity.

But even with this type of suspension it has been found possible to produce cars free from shimmying tendencies. These cars had relatively high spring rates, however, and consequently poor boulevard rides. Whether or not this had an effect on reducing the shimmy tendency I don't know. As a matter of fact, lower spring rates should help to overcome bad synchronous front-end periods with this type of suspension.

Radius rods have been found helpful in overcoming shimmy tendency with hinged axles. Kick shackles, on the other hand, seem to aggravate the condition.

Large changes in track width are a necessary corollary of the camber variations accompanying wheel displacement. This produced discouraging tire troubles in early experiments,

particularly on large cars. The consistent stripping of treads from the tires was sufficient reason, in a number of cases, to abandon experiments with hinged front axles.

There seems to be reason to believe, however, that an increase in spring flexibility would obviate some of this trouble, by permitting the tire to roll sideways rather than be squashed sideways. Experimental data along this line are not available. The absence of tire-tread destruction reported for hinged axle suspensions at the rear, where spring rates were lower, seem to bear out this theory. Large tire sections with reduced pressure should further minimize this difficulty.

Incidentally, for opposed displacement of the wheels the change in track is in the same direction for both wheels—either to the right or left. This has a tendency to cause a ducking of the car from side to side on extremely rough roads.

With respect to elimination of steering wheel fight, it would seem rather difficult to combine geometrical correctness of the steering layout with simplicity. Good results have been obtained, however, even without compensating entirely for geometrical variations. Use of radius rods also has been helpful in this direction.

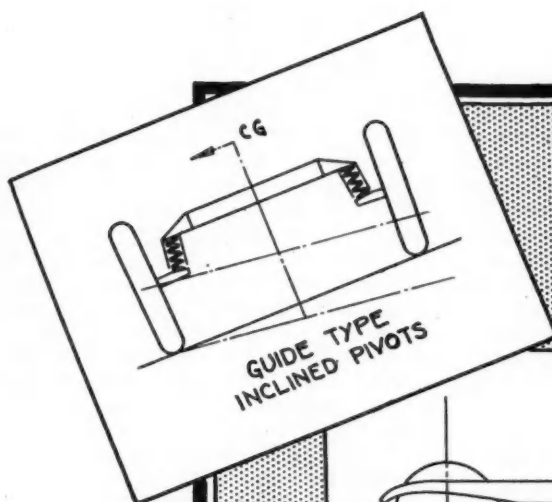
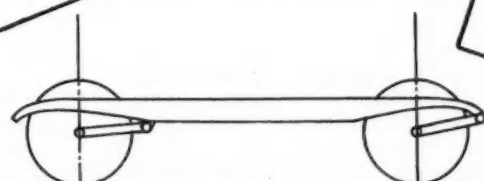


Fig. 8



SHORT BASE CRANK ARM TYPES LONG BASE

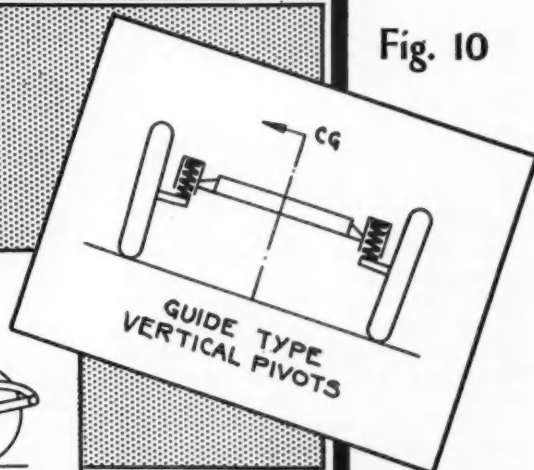


Fig. 9

Fig. 10

Hinged axles have an inherently higher resistance to side roll on curves than other types. The shorter the distance of the wheels from the hinge points of the arms, the greater the stability for a given spring rate measured at the wheel. This is due to the high location of the instantaneous center of rotation for the car (see illustrations) giving a lower value for the centrifugal moment. For this reason, lower effective spring rates could be used theoretically, at least, with hinged axles than with other independent suspensions.

Another advantage of the hinged axle is the much smaller lean of the wheels in curves. In a long-hinged axle there is a slight outward lean. In a center-hinged there is none. With a short-hinged type the wheels actually lean into the curve.

While center and short-hinged axle types have not been tried at the front to my knowledge, they have been used at the rear. Their use here, compared with other independent suspension systems, has the advantage of eliminating two universal joints in the driving mechanism—the ones at the wheel. Offsetting this advantage are the clearance requirements to provide for the changes in wheel camber with respect to the chassis. This means either a wider track or a decrease in rear seat width between wheel housings.

With the short-hinged type the differential is rigidly supported in the frame. With the center-hinged type it is pivot-mounted in the frame.

As with other linkage-type of suspension systems, hinged axles require considerable increases in torsional frame rigidity. With this construction, similarly, road reactions and side thrust are carried directly into the frame through the axles. Lateral stiffness of the frame therefore is essential.

Production tolerances for frames, axle arms, etc., provide an even more serious problem with this design than with transverse link parallelograms. It is no simple matter either to provide for service adjustment of the king-pin caster angle.

Dead Axles:

The possibility of using a dead-axle type of suspension at the rear of the car should probably be included in this discussion. Such designs have been successfully used experimentally by several manufacturers to reduce axle chatter, by reducing unsprung weight in the driving axle. This design was used in the front axle of the Cord front-drive car.

Whether the improvement in riding qualities justifies the additional cost involved, since drive shafts to the wheels have to be provided with two universal joints each, can be determined only by individual experience.

Following are some general lessons

learned from experiments with so-called independent suspensions. Many of these findings probably could be applied also to conventional suspension systems.

Front-End Geometry:

Experience seems to indicate that if variations in king-pin caster angle in driving can be eliminated, a minimum king-pin caster should be specified. Provisions for service adjustment of caster should be made, however. With independent-suspension systems there is little if any loss in steering recovery due to specification of a small caster angle.

Elimination of operating variations in caster reduces shimmy, steering wheel pull on brake application, and wheel fight generally, experience seems to show.

That operating variations in toe-in do not have a serious effect, except possibly with respect to tire wear, seems to be shown by absence of troubles on independently-sprung cars with conventional steering arrangement. Provision for service adjustment of toe-in should be retained, however, when compensating steering layouts are provided.

Initial camber specifications on independently-sprung cars will probably differ materially from those for conventional suspensions. The amount of static wheel camber specified, it would seem, should depend largely on the type of design and the spring rates used. Specifications of production tolerances to control the camber raises some interesting production problems.

A slight operating variation in camber, however, seems to be regarded as preferable to operating variations in track width, in spite of the general opinion that front wheels should be displaced as nearly as possible parallel to each other and to the chassis. This applies particularly to parallelogram-type systems.

Independent suspension in itself is not a cure-all for steering troubles, including brake pull, wheel fight and wheel kick. A poorly laid-out independent suspension is worse than a good conventional one in these respects. There is some reason to believe, however, that good results can be obtained with greater ease with independent suspensions. The positive guiding of wheels in some systems simplifies the job of eliminating steering troubles.

Both shimmy and tramp can be produced with independent suspensions, although the shimmy is different in character and tramp generally smaller in amplitude. Elimination of synchronous periods in the frame, etc., is essential.

With regard to the requirement for greater effective steering power with independent springing systems, an increase in steering ratio seems to be indicated as in order, since it isn't an

easy matter to get more efficient gears than we already have.

Tires:

If the suspension system permits material operating variations in track width, larger and lower-pressure tires might be desirable. Edges of tire treads should probably be rounded off to prevent excessive scuffing on curves with most independent suspensions.

Rib-tread tires appear desirable from a noise standpoint with suspensions systems in which the wheels are guided by arms or links. Whether the decreased stopping ability reported for such tires on wet roads is an important consideration I would prefer to leave to someone else.

In addition to front wheel alignment, spring rates may have an important bearing on tire life with some suspension systems.

Riding Qualities:

Independent springing itself does not automatically improve riding qualities of the average car, except perhaps on washboard or rough roads. If no other changes are made, the boulevard ride is generally less satisfactory than with a conventional axle. Virtually all European independently sprung cars have a boulevard ride which would not be acceptable in this country.

In rear suspensions of the independent type, the reduction in unsprung weight possible by mounting the differential in the frame materially improves the ride by reducing axle chatter.

For front suspensions the reduction in unsprung weight obtainable is too small to have an appreciable effect on riding qualities.

Spring Rates:

To obtain a good boulevard ride it has been found necessary to materially reduce front-spring rates. Increasing spring flexibility does not necessarily affect the high speed ride adversely; in fact, it may be improved.

A material increase in front-spring flexibility should be accompanied apparently by elimination of static or friction damping of the suspension system. Taken together, soft springs and the elimination of static friction seem to produce a ride remarkably free from gallop, without seriously influencing the gains achieved with independent suspension on rough roads.

The biggest improvement under these conditions is in the rear seat ride. Soft front springs furthermore have a tendency to reduce synchronous front-end periods.

There is a difference of opinion as to whether softer springs would require an increase in permissible spring travel. No doubt it would be desirable if it could be obtained without

Fig. 11

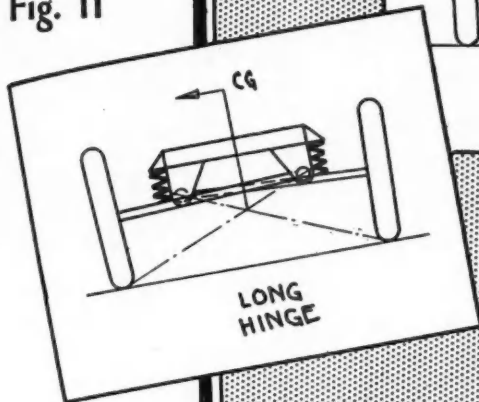


Fig. 12

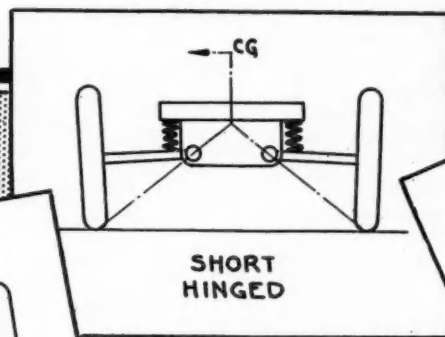
CENTER
HINGE

Fig. 14

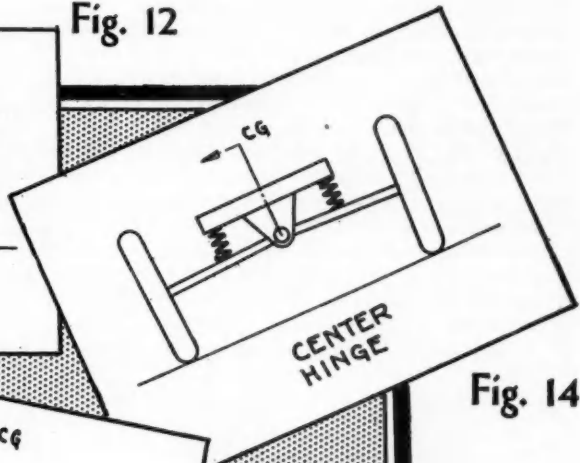
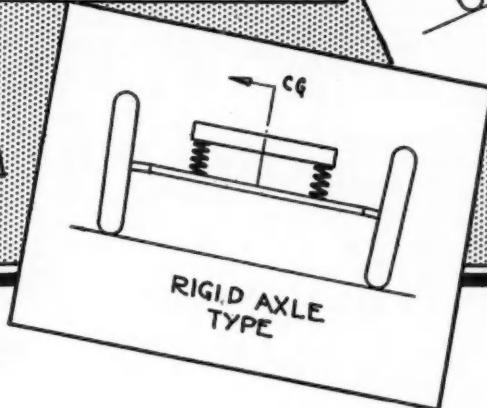


Fig. 13



sacrificing too much road clearance or raising the center of gravity. If more spring travel is found necessary, larger-wheel options may have to be offered on cars going into sections where rutty roads predominate, and for export.

Reduction in front-spring rates also increases the tendency for a car to nose down at the front under brake application due to weight transfer. Objection has also been raised to the greater difference in height of a car when loaded and unloaded, when equipped with soft springs. Another reported advantage of lower-rate front springs is a decrease in the tendency of rear springs to strike through by imparting less angular acceleration to the chassis when the front wheels hit a bump.

A reduction in spring rates, however, is accompanied by an increase in spring stress. A material increase in flexibility would automatically demand either an increase in spring length, more springs, or better spring materials. For a given suspension, if the spring rates are reduced chassis distortion is also reduced.

Leaf vs. Coil Springs:

Increased spring stresses, together with a desire to eliminate static friction, has led many experimenters to coil springs. The question of which is the more desirable, a leaf or a coil spring, will probably depend on the individual car. It is certain that coil springs introduce some entirely new design problems both for springs and for the car as a whole.

If coil springs are to be used their

location on a car is limited by permissible ratios of height of the coil to diameter and spring stress. I am informed that with transverse parallelograms, for instance, the theoretically most desirable location of the spring is somewhere between $\frac{1}{4}$ and $\frac{2}{3}$ of the distance from the king-pin to the frame hinge point of the lower link. This might be impossible from clearance considerations. If the coil spring were located outside of the frame side rail, then the length of the lower link would be automatically limited. This is not true of leaf springs.

In production, coil springs require much more accurate finishing. Since the torsional resistance of the spring, which in the case of the coil spring determines the spring rate, varies with the fourth power of the wire diameter, any material variations in wire thickness will result in a car which sags to one side or the other. Accurate finish grinding is essential.

It is important to protect coil springs against stone bruises. Guiding of coil springs is not an easy matter either. On heavy cars it becomes even more difficult to find the necessary clearances for the installation of the large-diameter coil springs required.

In spite of these considerations, however, it may be cheaper to use coil than leaf springs on some cars. Elimination of static friction in leaf springs involves the use of anti-friction bearings at the spring eyes and some form of inserts between the leaves. I might add that some engineers still feel that leaf springs should be retained because of the oscillation damp-

ing characteristics of the several different leaves, each with its own natural period.

Shock Absorbers:

Lowering of spring rates apparently does not necessarily have a major effect on shock absorber requirements, providing static friction is eliminated. Some compression control is needed, apparently, but not much more than with conventional suspensions. Not much more rebound damping is needed either. It may be necessary, however, to increase the capacity of shock absorbers with low rate springs. This belief may account in part for the present popularity of direct-acting shock absorbers with their higher oil capacities. Care should be taken that the shock absorbers do not increase the natural period of the suspension system.

Stability and Center of Gravity:

Softer springs naturally decrease the stability of a car on curves at high speed. With independent suspensions this is reflected simultaneously in increased lean of the wheels and harder steering. Some compensation will probably have to be provided for this. Stability can be built up with the rear suspension, if desired, but only within limits. Beyond this a torsional chassis stabilizer may be necessary.

Lowering the center of gravity to decrease the overturning moment doesn't hold much promise with independent suspensions. The gain in stability is less than it would be with

a conventional axle design. Furthermore the question of road clearances under the crankpan, especially with softer springs, automatically eliminates this solution. As a matter of fact, for the same height of center of gravity the effective minimum road clearances are less with independent suspensions systems than with conventional axles.

The claim that independent suspension permits lowering of the center of gravity doesn't seem to hold water. If anything, a higher center of gravity would be indicated as desirable.

Car Design:

There remains the question of the effect on car design generally if independent—or, as I believe the public would correctly refer to them, "axle-less" suspensions—were adopted. Experience so far seems to have indicated rather definitely that independent suspension isn't something that can be added to a car—it requires a redesigning of the car around the suspension system. Some of the factors involved are:

FRAMES—Must be exceedingly rigid both torsionally and laterally. Radical changes in design probably needed, both for rigidity and for suspension system clearances; new production methods, also possibly with an increased amount of welding. Closer production tolerances must be specified. No localization of frame deflections at the front end may be permitted. With flexible engine mountings additional bracing seems essential.

BODIES—Body and frame should be tied together more rigidly than previously, making the body contribute more to chassis rigidity, especially near the front end. A truss bracing of body and frame forward of the dash, as used on one production car at present, should help materially.

FENDERS—Best method of overcoming fender vibrations is probably by supporting them flexibly from the center of the frame, thereby reducing their natural periods of vibration. Otherwise a more rigid bracing of fenders is indicated, with a further effect on frame design.

REAR SUSPENSION—If the differential is to be mounted in the frame, some cars will require considerable redesigning to obtain a satisfactory straight line propeller shaft drive without tunneling the body, to make possible elimination of universals. For the drive to the wheels, constant-velocity joints would probably be desirable, and definite rebound and compression stops must be incorporated in the suspension to prevent damage to the universals from excessive angularity, particularly on rebound.

FRONT SUSPENSION—Definite compression and rebound stops needed here also. Probably would be desira-

ble to use a more gradually cushioned compression stop, to reduce the shock from a possible striking through with soft front springs. On large cars it appears necessary to increase the jounce space to gain much from independent suspension. In doing this, previously mentioned limitations on road clearance should be kept in mind.

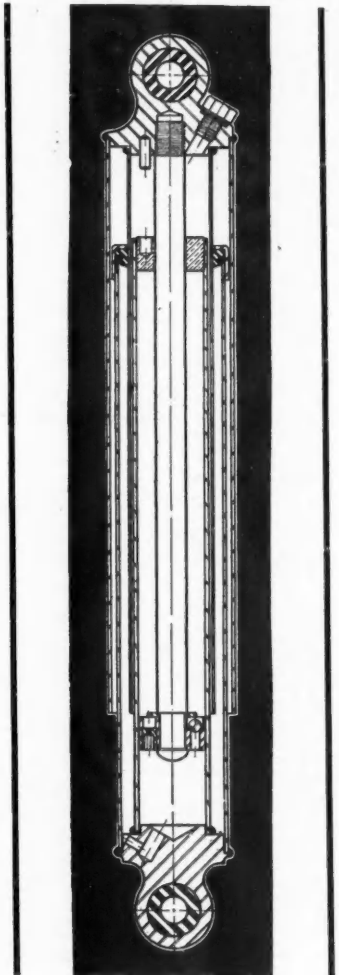
WEIGHT—Experiments on independent suspensions seem to have supported the belief held by some engineers that proper weight distribution in relation to riding qualities merits considerably more attention than has been given it in the past. On weight, generally, independent suspensions while decreasing unsprung weight in some cases, especially at the rear, tend to increase the over-all weight of the car.

CONCLUSIONS

It may well be said that some of the advantages obtained with independent suspension systems could be duplicated with conventional axles. However, even if this were to be the only outcome, the time and money expended on suspension systems experiments would be well justified. Among the things which seem to have been learned or confirmed are:

1. A good rear seat ride can be obtained by a lowering of front spring rates.
 2. The elimination of wheel fight and wheel kick depends entirely on the correctness of the geometry and stability of the steering layout.
 3. Shimmy and tramp are not governed entirely by the presence or absence of gyroscopic precessions. They can be overcome even in designs where gyroscopic couples are built up on the road. Conversely, even where such couples do not exist, shimmy and tramp can develop through poor car design.
 4. A reduction in unsprung weight in the rear axle is of decided benefit. The advantage obtainable here with independent springing cannot be duplicated with conventional suspension.
 5. The reduction in unsprung weight possible in front axles contributes less to an improvement in ride than other factors.
 6. In contrast with European experience, independent suspension can be made to give an improved slow speed or boulevard ride. This is not a function primarily of the suspension system used, however, but rather a function of spring rates and periods.
 7. Resonant vibrations in different parts of a car can be reduced by improvement in the design of the suspension system, but even more by other design factors.
 8. A better rough-road ride probably can be obtained with independent than with conventional suspension.
- Balanced against the gains obtained with independent suspension is first of all the increased cost. This is due partly to increased weight, and partly to increased cost of the suspension system itself. Also balanced

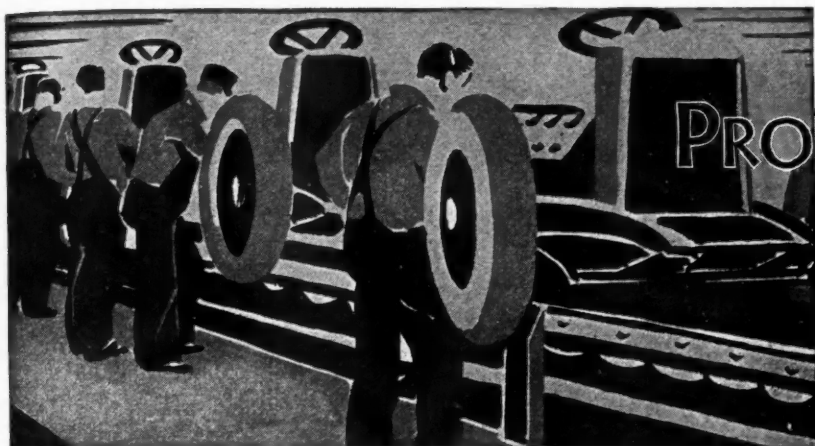
against the advantages of axle-less suspension, and varying with the different systems, are the disadvantages I have enumerated. The final decision as to which of these disadvantages are important and which are not will probably be left to the public.



This illustration of the Monroe direct, double-acting hydraulic shock absorber inadvertently appeared in the October 21 issue of *Automotive Industries* wrong end up

Year Round Anti-Freeze

Walter Ostwald suggests in *Automobiltechnische Zeitschrift* that now that non-volatile anti-freeze solutions, suitable for year-round use, have been widely adopted, car manufacturers may find it to their advantage to furnish the anti-freeze with their cars, the same as electrolyte is furnished in the storage batteries, and provide the drain cocks of the cooling system with special safety devices giving assurance against loss of cooling fluid.



PRODUCTION LINES

Small Things

And don't forget that a couple of drills on a multiple drill set-up can cause the whole machine to break down. In automotive production particularly the quality of the drill is the most important factor. Insist upon the drill that keeps its cutting edge longer under a heavy pull.

Traces Origins

New Jersey Zinc Co. has just published a brochure giving in full six installments of "Case Studies in Product Design" which appeared serially last year. It covers the origin of 18 new products placed on the market in 1933. Not all automotive but all interesting as to method of approach in consumer research. A copy is yours for the asking.

Bottle Necks

Biggest problem ahead for production men is to locate the bottle necks in the lines and then find ways of opening them up. The weak spot may be an inspection station or some fussy finishing operation or tricky tooling or something else. But it has to be weeded out in the interest of efficiency under the new deal.

More Economy

Getting down to fundamentals, the time study department is being asked to make careful scrutiny of all extra time allowances in an effort to cut costs. This applies not so much to ordinary allowances which act as a factor of safety for the employee but to the losses due to unnecessary delays. Breakdown of conveyors or tooling or machine equipment must not be tolerated.

Nor is it economical to jeopardize a building program through lack of material.

Splitting Cycles

A high speed timing device developed by Westinghouse gives visual instantaneous reading of minute time intervals by dividing one cycle of a 60 cycle wave into sixty, a hundred or a thousand parts. Although used in the laboratory to show the fraction of a cycle required for a high speed relay to operate, the method could be used for the measurement of elapsed time of almost any brief event.

Mainly Gages

Although it's labeled a catalog, the latest manual put out by The Brown Instrument Co. is really a handbook on thermometers and pressure gages of every kind, for all kinds of work. It exemplifies the spirit of the slogan of this organization—"To measure is to economize." Ask for Catalog No. 6702, "Brown Thermometers and Pressure Gages." We'll be glad to oblige.

Vizetelly Says—

that a streamline is a form or body so constructed as to produce an uninterrupted flow of fluid around it. Which means that a streamline is one designed for the conditions in which it operates. A fish is streamlined, a turtle is streamlined, and so is an airplane. But the forms are different. That's why students like Stout and Ledwinka say that the form for an automobile body must be different. It must be streamlined not only along its vertical profile but also along its horizontal profile—the sides.

Paradox

Bill Stout got off a real gem the other day. He was taking engineers to task, as usual, for building vehicles which he believes are more efficient if run backward. It seems that some factory executives are inclined to agree but they feel that the public is not receptive to any sudden and radical changes in the design and appearance of their cars. CHANGES such as putting the engine at the rear must be made gradually, they say. To which Bill Stout retorts: "How can you gradually change the position of the engine from the front to the rear?"

Riveting Aluminum

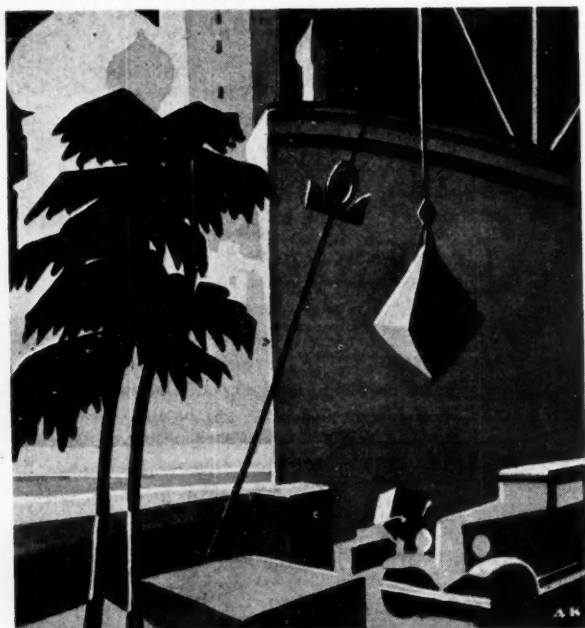
A handbook on "The Riveting of Aluminum" has resulted from a careful study of current practice in aircraft work and allied fields. Design data, production methods and equipment, as well as a discussion of rivet alloys for various situations are all covered thoroughly in this manual. It's published by the Aluminum Company of America. Get yours now.

For Service

For the exacting service demanded of modern machine tools particularly of the multiple-head variety, Wagner Electric Co. has developed a line of totally enclosed motors of simple design. How these power units fit into the picture is shown in Bulletin 174, which describes a large group of pretty well-known special high production machines. We didn't know either that all of these machines are powered by Wagner.—J.G.

MANUFACTURING
MANAGEMENT
METALLURGY

Exporters Get Fewer



by Thomas
C. Ballagh*

ABOUT the time Uncle Sam went into partnership with American business, he moved in the opposite direction so far as the country's foreign trade is concerned. Responsible for the change was the imperative necessity of cutting federal expenditures and the belief by the new administration that getting into the sales problems of individual manufacturers, was not a proper governmental function. For these reasons, the comprehensive trade promotional organization which previous administrations had made world-wide, was largely disbanded.

"Having helped American business through the crawling stage of exporting," Mr. Ballagh states, "the Government now says that it ought to be able to walk by itself." In the accompanying article, Mr. Ballagh discusses where and how automotive manufacturers can get the kind of help the Government used to give.

AMERICA'S foreign trade was presented with a serious handicap, when, on July 1, 1933, the Bureau of Foreign & Domestic Commerce, that important division of the Department of Commerce which over the past decade has been a most valuable aid to American manufacturers and exporters, was abruptly cut to about a third of its former size. Over half the foreign offices it maintained were closed, and more than

100 of the 160 Commercial Attachés and Trade Commissioners attached to our Embassies abroad were recalled and asked to resign, while most of the personnel at Washington and in the principal cities of the United States were told there would be no money to pay their salaries after July 1.

Why was this done? In order for President Roosevelt to keep his promise to the American people to cut Government expense and bal-

ance the ordinary budget, it was necessary to curtail many Government activities, and to cut out services which were admittedly valuable, but for which money was lacking. This had to be done by July 1, when the Government fiscal year begins.

In this new deal for American foreign trade, our exporting manufacturers will have to play the game with fewer trumps. While in the past they counted heavily on the support of the Bureau, for information and personal assistance, now they will have to bid and play their hand with less information and with little or no individual assistance from the Government.

The Bureau of Foreign and Domestic Commerce helped many an American manufacturer to get started in foreign trade, showed him the ropes, pointed out the pitfalls, and rendered first aid to those who through ignorance had burnt their fingers. When its Commercial Attachés and Trade Commissioners, acting as trade scouts in distant countries, found a chance for American goods to be sold, it flashed the news back by cable, air-mail or official report. The organization in Washington and in the district offices throughout the United States published the news and notified the manufacturers of that product. To those which were interested in these trade opportunities, the Department gave the necessary help toward getting the order.

If you were a manufacturer, whether of special motor trucks, automobile heaters, brake lining, or automobile upholstery, and wanted to know if your article could be sold abroad and where, the Department put its world-wide organization at your disposal, without charge. In more than 60 foreign countries, the department field men investigated through their contacts in that particular

*Former Automotive Trade Commissioner to South America, of the United States Department of Commerce.

Trumps in the New Deal

But there are other sources of the kind of help the government used to render automotive manufacturers interested in developing foreign trade. This article tells about them

trade, told you the prices at which your foreign competitor sold, and what your chances were of competing. In countries where it could not be sold, they saved you the expense of sending your salesmen on a useless errand. In others they found you an agent or distributor, gave you lists of customers, and trade information about each of them. Every month or two they reported changing conditions in the market. If some misunderstanding between you and an agent or customer occurred, they helped straighten it out. If increased duties on your product or restrictive legislation was rumored they advised you at once, and looked after your interests at that end.

Having helped American business through the crawling stage of exporting, the Government now says that it ought to be able to walk by itself. Under the new set-up of the Department of Commerce, its few remaining Commercial Attachés and Trade Commissioners will no longer devote their attention to direct trade promotion, or give individual attention to any one manufacturer's problems or product. They will be limited largely to reporting current information on the general market for important groups of commodities; to supplying general statistical information on commerce to the Government; and to reporting new tariffs and regulations. The Wash-

ington organization will publish these reports and transmit lists and the valuable "World Trade Directory" reports prepared by the Consulates. These "W.T.D." reports on the individual foreign firms give much information as to their organization, as well as indicate their general reputation and give the firm's financial and trade reference.

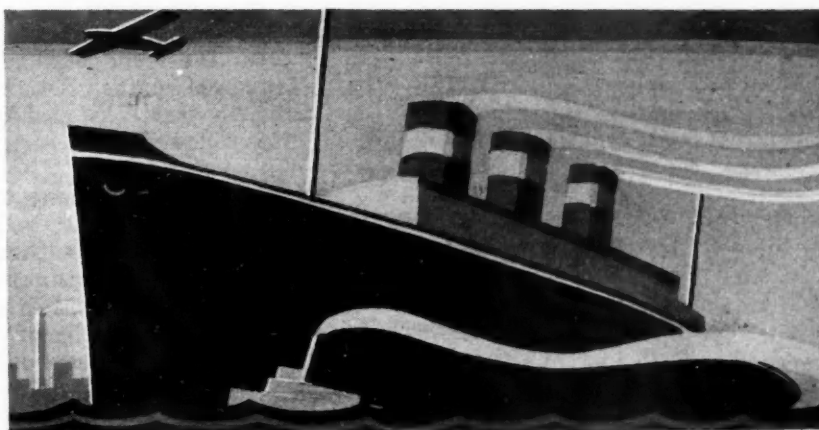
Those manufacturers, however, who are not aware of the change in the policy of the Department of Commerce will find the letters they send to the remaining Commercial Attachés and Trade Commissioners will be turned over to the Consulates for such information, lists and assistance as the Consuls and Vice-Consuls may be able to give as part of the usual commercial

work which they do along with their multiple duties of attending to shipping documents, passport visas, registrations of births and marriages, and protecting the interests of American seamen and private American residents and tourists.

Manufacturers large and small, especially those who are new in the export field, are going to miss the reliable, unbiased and worldwide information which they formerly received from the Government, and the business-like, personal assistance it rendered. But they will not abandon foreign trade. Where else can they get information and help?

American banks which have foreign departments often maintain extensive files of financial and credit information on foreign buyers for the benefit of their depositors. Some of these banks have branches in foreign countries with commercial departments equipped to give much information and help in those markets, at least to the extent which may seem in proper relation to their possible profit from present or future operations with the company which asks for the assistance. The credit reporting agencies, such as Dun & Bradstreet, give credit information and handle collections.

Chambers of Commerce in many larger cities of the United States have foreign departments, some of



which cooperated closely with the Department of Commerce in the past, and are still able to supply certain information and lists. Certain trade associations—such as the National Automobile Chamber of Commerce, in New York—maintain files of data on foreign markets for their class of products. Large newspapers in New York, Chicago and a few other cities report not only political conditions in foreign countries but also important new regulations affecting large groups of exporters, and the trade magazines follow up in greater detail those affecting their type of product. Some export trade magazines, such as the *AMERICAN AUTOMOBILE* (Overseas Edition) and the *American Exporter*, publish "Trade Opportunities" of their subscribers in foreign countries which want to secure the agency of distributorship for American products.

There are several large advertising agencies which maintain branches abroad and which will make detailed market surveys for the products of large manufacturers who plan to spend considerable sums in advertising their goods abroad. Customs brokers and freight forwarders keep well informed on changing regulations of many countries, and attend to preparing documents and shipping goods once you have secured the order. The various steamship lines which are interested in securing freight on additional exports often try to find foreign connections for manufacturers. Foreign trade associations, usually composed of export managers and others interested in export and import, encourage their members to exchange information with each other on matters of mutual interest.

While these sources of information are available to the domestically trained sales manager, the most intelligent use of them is naturally made by men with experience in export work. The export manager of a company doing a substantial export business will use these sources to supplement those he already has—his earlier fund of knowledge and experience gained from business trips abroad, and the reports of his agents. His use will be chiefly as a method of keeping up to date on changing conditions.

There are, however, many manufacturers, large and small, whose interests are primarily domestic but who nevertheless welcome any export business which comes their way. Many of these are more than

passively interested but are handicapped because they cannot justify the creation and maintenance of a competent export department. What can such firms do now that the Department of Commerce, which formerly filled this gap rather well, can no longer render the type of assistance needed? Salesmanagers trained only in domestic work, find export details too complicated for ready comprehension, and taking up to much of their valuable time, as they do not know how to use the sources previously mentioned to best advantage and with a minimum of lost time.

For some manufacturers in that position, an export counselor and independent foreign sales manager, if he is a competent one, can frequently fill their needs economically and perform a valuable service. This is the case also for manufacturers who want to save the fixed expense of maintaining their own export department with a salaried personnel which may not be justifi-

fied by the present export volume or immediate prospects.

Most of them are men engaged in this type of work who have had some years of practical foreign experience of one kind or another, and have more or less comprehensive foreign connections. They make market surveys and answer questions or secure information, usually on a fee basis, or handle a manufacturer's export business, either for a retainer fee and a commission or on a straight commission basis. As they frequently divide their time over several factories making related but non-competing lines, they are able to use the same foreign agents, and the same information regarding customers and changing conditions, for these several factories, with resultant economy. As, however, results depend largely upon the ability, experience and foreign connections of the export counselor or foreign sales manager employed, care in selection is obviously advisable.

Internal Combustion Engines

Internal Combustion Engines, by Streeter and Lichty, fourth edition. McGraw-Hill Publishing Company, New York.

Internal Combustion Engines, by V. L. Maleev, first edition. McGraw-Hill Publishing Company, New York.

It is undoubtedly quite rare that a publishing house brings out two books bearing exactly the same title at practically the same time. One explanation of it in this instance is that one of the books is a reedition while the other is a new one.

While both volumes cover the entire field of internal combustion engines, that by Professors Streeter and Lichty has more of an automotive slant, while that by Professor Maleev deals with the subject more from the standpoint of the large low-speed engine. Both books are primarily textbooks, each chapter being followed by a series of exercises.

The first of the volumes mentioned, which was originally written by the late Prof. Robert L. Streeter of Rensselaer Polytechnic Institute, has been revised for recent editions by Prof. Lester C. Lichty of Yale University. For the present edition the text has been thoroughly revised and much new material has

been added. The difficult parts of chemical equilibrium in the combustion process have been simplified, in fact, the revision seems to have been most thorough in the chapter on the Combustion Process from which much material has been eliminated while new material has been added. A new chapter on Combustion Chamber Design has been added, the subject of fuel injection is dealt with more fully, and a section on the knock-testing of fuels has been added.

Professor Maleev's book deals chiefly with the fundamentals of internal combustion engines. The early chapters are devoted to such subjects as Classification of Engines, Principles of Thermodynamics, Theoretical Cycles, Engine Performance, Four-Stroke Explosion Engines, Four-Stroke Combustion Engines, Two-Stroke Engines, Engine Efficiencies, Fuels, Combustion, Handling of Light Fuels, etc. Design of parts is dealt with in the later chapters.

Both volumes are well illustrated. In the book by Professor Maleev, most of the illustrations are drawn from the low-speed engine field.

NEW DEVELOPMENTS

Automotive Parts, Accessories and Production Tools

Surface Grinder for Tool Rooms

The Monarch Machine Tool Co., Sidney, Ohio, has just placed on the market a hand feed precision tool-room surface grinder having its direct-drive motor connected with the



Monarch tool-room surface grinder

built-in anti-friction bearing spindle unit made by Ex-Cell-O, which was described in *Automotive Industries*, Oct. 28, 1933.

Instead of a rack and pinion for table traverse, a roller chain and sprocket are used. One turn of the traverse hand wheel gives 2 in. table travel.

The motor is 1 hp. capacity, 3500 r.p.m. full load. Floor space required 66x41 in. Net weight, 1400 lb.

High Precision Jig Borer

The Index Machinery Corp., Cincinnati, Ohio, is announcing the introduction of the new No. 3½ Hauser Jig Boring Machine, built by Henri Hauser Company of Bienne, Switzerland.

Among the new features is a patented method of insuring absolute

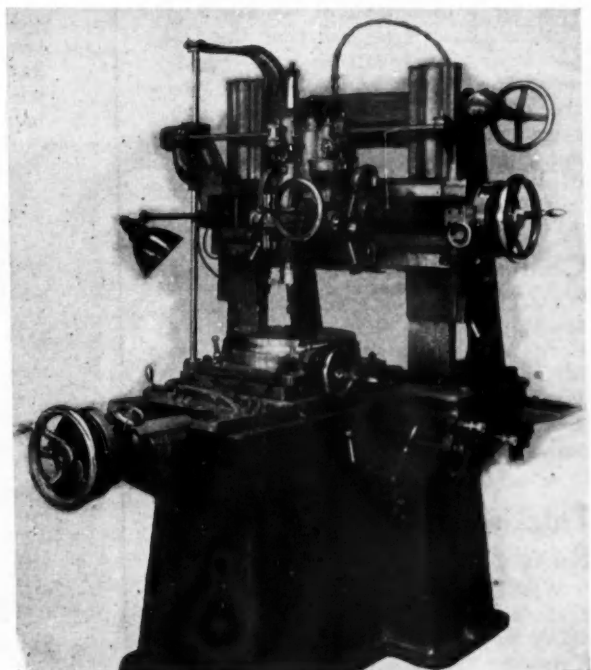
alignment between the boring spindle and the work table. This is established and maintained by equipping the cross-rail with hardened, ground and lapped locating plungers, which rest on hardened, ground and lapped locating blocks mounted on the housing. The bearing contact is made at the outer end of the cross-rail, and since no possible wear takes place through this method of locating the cross-rail and no weight is suspended on the elevating screws, absolute alignment between the spindle and work table results.

Other features are: the large micrometer reading wheels for quick, accurate setting; force pump lubrication of the boring spindle; automatic, reversible feeds; general massive construction and central control.

The working surface of the table is 26 in. by 16 in. and the spindle speeds range from 50 to 1500 r.p.m. The maximum boring capacity is 4 in., and by the use of a high speed drilling and boring attachment with 3000 r.p.m. spindle speeds, the smallest holes may be drilled or bored accurately and economically. The machine is driven by a standard one-speed motor or by single-pulley belt. Weight is approximately 4200 lb.

Universal inclinable or plain circular tables as well as many other special attachments are available to greatly increase the utility of this machine.

Hauser jig boring machine No. 3½



A Battery Fully Enclosed

A new design of automotive storage battery in which the metal parts that are usually exposed, are protected by a hard-rubber cover, has been placed on the market by the



New Goodrich "Electro-Pak" battery

B. F. Goodrich Co., Akron, Ohio, in sizes to suit all of the popular makes of passenger cars. With these metal parts fully enclosed, all danger of short circuits by metal parts dropping across the terminals is eliminated, and it is claimed that the chances of corrosion and power leakage are greatly reduced.

When water has to be added to this "Electro-Pak" battery it is not necessary to remove the cover. The plates of the battery have rounded edges and corners, and Port Orford cedar separators and positive-plate protectors are used.

Goodrich has been engaged for a long time in the large-scale manufacture of battery cases and other parts of storage batteries, and we are informed that the manufacture of complete batteries was taken up only after several years of experimental work.

Johnson Says Issue Is Compliance with President's Executive Order as McCarl Rules Ford Co. Eligible

WASHINGTON—With the return to Washington of General Hugh S. Johnson, National Recovery Administrator, from his wide airplane tour of the West and South in defense of the NRA, the prolonged and bitter differences over the matter of Henry Ford getting or being denied Government contracts is expected to come to a definite head.

The first round has been won by Mr. Ford, his eligibility for Government contracts having been upheld by a ruling of Controller General J. R. McCarl. General Johnson disagrees with the controller's finding and expresses the belief that Mr. McCarl has incorrectly interpreted the orders of President Roosevelt concerning the giving of Government contracts only to those cooperating with the NRA.

In effect, Controller McCarl held that the automobile manufacturers' code is law and that since evidence was lacking to show Mr. Ford's non-compliance with the code, it is to be assumed he is complying with it and is therefore entitled to Government contracts.

The ruling of Mr. McCarl was contained in letters to the Secretary of Agriculture and the Secretary of Commerce. They were directed to these cabinet heads because the Department of Agriculture had opened bids for 1000 trucks for the transportation of Civilian Conservation units to the South while the Department of Commerce was in the market for four cars and six trucks for its airways division.

It is reported that the Presidential order against those not actively cooperating with the NRA may be tightened. Many believe the order of last August was inadequate to provide for enforcement of its intent.

Meanwhile, it is said that the Department of Agriculture and Department of Commerce bids for cars and trucks may be rejected and new specifications issued after the promulgation of a more rigid Presidential order. The delay would be

(Turn to page 626, please)

Continental Meeting Postponed

DETROIT—The special meeting of stockholders of Continental Motors Corp. which was scheduled for Nov. 8th, has been postponed until Jan. 17th, the day of the annual meeting. The special meeting was originally called for July 6th.

Trucking Code Ready for Hearing

WASHINGTON—The Trucking Code underwent an intense scrutiny today at a meeting of the American Trucking Association, Inc., repre-

sentatives of which assembled here from 28 states to give the tentative code final consideration before the hearing scheduled for Thursday.

The rate making provisions of the code were greatly clarified. As it now stands, it provides that minima rates and tariffs formulated by trade agreements shall be directly related to and not more than existing rates and tariffs for like service of competing transportation agencies not within the industry. Interpreted, this means that the minimum trucking rate may be the same as or lower than the railroad rate and leaves the truckman free to place his maximum above or below the rail rate as he sees fit.

An important addition was made to the definitions of the term "trucking industry." This specifies that the term shall also include transportation carriers, whether for hire or not, hauling automobiles under their own power. Thus the vast business of factory drive-aways becomes subject to all provisions of the Trucking Code.

Powell Hearing Deferred

The National Labor Board also announced that the hearing scheduled for Nov. 9 in the case of the Powell Muffler Company, of Utica, N. Y., had been postponed until Nov. 16, after the Board had received word from Michael Walsh, president of the Utica Central Trades and Labor Council, that the workers agreed to the company's request for postponement.

"50,000 Frenchmen Can't Be Wrong"

By obliging petrol refiners to take over the excess stocks of national alcohol and mix them with motor fuel, an injustice is being done to motorists in general, declares M. Louis Renault. These petrol-alcohol mixtures are not satisfactory, for they deteriorate valves, tanks and carbureters, and they damage paintwork. Acceleration is less satisfactory, or if equal acceleration is obtained, it is at the cost of a 4 per cent increase in fuel used. Starting is more difficult, and there is a much greater tendency towards vapor lock. One of the most serious troubles experienced in France is the tendency of the alcohol to absorb humidity.

M. Renault considers that instead of forcing these excess stocks of alcohol on motorists, merely for the benefit of farmers, the Government would have

been better advised to encourage its use for heating and cooking purposes, particularly in the country, where gas is not readily obtainable. For this particular work it has advantages over petrol. A great demand could be created for toilet purposes if the present taxes were reduced.

It is suggested by M. Renault that three kinds of fuel be created, (a) a cheap petrol-alcohol mixture which would be used by taxicabs and other vehicles constantly in service; (b) normal straight petrol; (c) high-grade motor spirit. Meanwhile every dealer in France appears to be doing his best to convince his clients that the fuel he sells does not contain alcohol. In this they are not altogether successful, for most of the fuel on sale smells like alcohol and acts like alcohol.—The British Motor Trader.

NEW

October U.S. Sales Are Estimated at 138,000

PHILADELPHIA — Registrations of new passenger cars amounted to 138,000 as against 63,195 a year ago and 157,976 during October of this year, according to an estimate based on returns from 22 states. These registrations show an indicated increase over last year of about 120 per cent, but a decline from September, 1933, of approximately 12.5 per cent.

Based on these partial returns Chevrolet still leads the field with 44,500, Ford second with 28,600 and Plymouth third with 26,500 units. For Chevrolet there is an indicated increase of 183 per cent over last year. Ford shows a 40 per cent increase and Plymouth has a gain of 488 per cent.

Speedwagons Down \$100

DETROIT—Reo has reduced price of Speedwagon models 1B and 2B \$100 to \$595 and \$845 respectively.

WS

Sales Show Normal Seasonal Drop as New Car Stocks Reach Satisfactory Low

Shortages in Some Body Types Likely to be More Pronounced as New Models are Ready for Announcement.
New Car Deliveries May Reach 100,000 in November

by A. F. Denham

Field Editor, Automotive Industries

DETROIT—In line with normal monthly trend, retail passenger car and truck sales fell off last week. Contributing influences may have been the Election and Armistice day partial holidays. With a sizeable proportion of major automobile producing plants shut down, new car stocks are being materially reduced.

As was anticipated a few weeks ago in these columns, shortages of some body types for some makes are already being felt, with the probability that further shortages will develop well before new model announcement time. The latter have been delayed in most cases beyond the anticipated date due primarily to the effects of the tool and die strike and also to design changes particularly in connection with suspension systems, which have not been definitely approved as yet in some cases.

Present indications are that November retail domestic new car deliveries will be close to the one hundred thousand mark. Truck sales, which are holding up better comparatively than passenger cars at the present time, should show less of a decline from October totals. Total truck sales for November actually may exceed twenty-five thousand units as compared with only slightly over ten thousand last year.

Retail sales reported by Chevrolet dealers for October reached 50,988 new cars and trucks, the best October since 1929, compared with 58,000 in September and 18,547 in October last year, a gain of 175 per cent.

Chevrolet dealers reported ten months' sales as totaling 550,816 new cars and trucks, compared with 354,517 in the corresponding period last year, a gain of 55.4 per cent.

New De Soto and Plymouth cars delivered by De Soto dealers in the week ending Nov. 4, totaled 2,455 units, an increase of 15½ per cent over the previous week, according to L. G. Peed, general sales manager. This was ten times greater than the same week of last year. During the same period a total of 3,081 used cars were delivered by De Soto dealers, a 10 per cent increase over the previous week and 300 per cent increase over the same week of last year.

Combined deliveries of new De Soto and Plymouth cars by De Soto dealers for the week ending Nov. 4 totaled 2455 units, an increase of 15½ per

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Assembly Line Strike Halts Nash Production

Workers Refuse to Give New Piece-Work Payment Plan a Further Try-Out

CHICAGO—After a vain attempt to mediate differences with 200 assembly line workers, the Nash Motors Company closed down its Kenosha plant Nov. 11, retaining only the office force.

The walkout of the assembly line workers throws 3000 out of work for an indefinite period. The walkout and shut-down came when the company had just reached peak production on the new 1934 models. The assembly line workers protested the wage scale.

The workmen walked out after C. W. Nash, chairman of the board, had visited three departments urging the men to give a new piece-work scale a longer trial.

A meeting of United Automobile Workers was held following the shut-down and 1500 Nash employees attending voted unanimously to picket the plant immediately. Picketing was to be peaceful, leaders insisted. The

(Turn to page 626, please)

MacGregor Made V.P. and G.M. of Packard Elec. Corp.

WARREN, OHIO—The directors of the Packard Electric Corp. have announced the appointment of B. N. MacGregor as vice-president and general manager. MacGregor has been with the Packard Company for fourteen years. He entered the sales department after the war and soon became sales manager of the cable division. He was later made general sales manager. He has been active in association work.

Studebaker Names Edwards Head of Its Truck Division

SOUTH BEND—Announcement of the appointment of W. H. (Cap) Edwards, veteran manufacturer and one of the founders of the Edwards Iron Works of this city, as general manager of all truck activities and a program of expansion in this branch of Studebaker's business during 1934 were made this week by Paul G. Hoffman, president of The Studebaker Sales Corporation of America.

C. H. Wondries will continue in charge of sales of the truck division, a post that he has held since 1925. J. L. Engels, director of sales promotion and truck advertising since 1925, will also continue with the title of sales promotion manager.



J. L. Engels



C. H. Wondries



W. H. (Cap.) Edwards

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

Reports on general business last week were somewhat conflicting. Some indicate that the decline has continued and is gaining momentum, while others hold a more encouraging view. The cooler weather and the election day holiday stimulated retail trade, which made the best showing of the fall season. There was little recovery in industry, although the rate of decline from last week was small in most cases.

Freight Loadings Lower

Railway freight loadings during the week ended Nov. 4 totaled 607,785 cars, which marks a decrease of 28,889 cars below those during the preceding week, an increase of 20,483 cars above those a year ago, and a decrease of 109,263 cars below those two years ago.

No Pronounced Business Movement

According to the Federal Reserve Bank of New York, there was no pronounced movement in business during the first half of October. It was also stated that sales of department stores in the metropolitan area of New York were somewhat larger after seasonal adjustment than those in the corresponding period in September but below those a year ago.

Power Production Steady

Production of electricity by the electric light and power industry in the United States during the week ended Nov. 4 was 3.8 per cent above that in the corresponding period last year.

Little Change in Employment

New York State factory employment during October remained unchanged after making steady gains in the six months preceding. Total payrolls, however, were 1.6 per cent below those in the preceding month.

Commercial Failures Less Than 1932

Commercial failures in the United States during October, according to Dun & Bradstreet, Inc., numbered 1206, as against 1116 during the preceding month and 2273 a year ago. The liabilities involved in the October failures amounted to \$30,581,970, as against \$21,846,906 in September and \$52,869,974 a year ago.

Wholesale Commodity Prices

Professor Fisher's index of wholesale commodity prices for the week ended Nov. 11 stood at 71.6, as against 71.8 the week before and 71.6 two weeks before.

Federal Reserve Statement

The consolidated statement of the Federal Reserve banks for the week ended Nov. 8 showed a decrease of \$5,000,000 in holdings of discounted bills and an increase of \$10,000,000 in holdings of government securities. Holdings of bills bought in the open market remained unchanged. The reserve ratio on Nov. 8 was 65.2 per cent, as against 65.2 per cent a week earlier and 65.5 per cent two weeks earlier.

Car Factories Meet NRA Wage-Hour Limits

WASHINGTON—The National Recovery Administration announced on Nov. 10 that it had received minimum wage and maximum hour reports, required under the Automobile Code, from all of the principal automobile manufacturers in the industry.

A cursory examination of the figures transmitted to the Administration by the National Automobile Chamber of Commerce designated in

the code to gather the data, indicates compliance with the wages and hours provisions by the reporting manufacturers. Pending further analysis it has not been determined what details, if any, of the reports will be made public.

Austin May Expand

BUTLER, PA.—Reports from sources close to the management of the American Austin Car Company indicate that "a new financial ar-

range which will considerably increase the available capital is imminent." The same authority states that if and when this rearrangement is completed an immediate expansion in the Austin manufacturing program will take place. Recent reports from the Austin company indicate that the company has unfilled orders on hand for over 700 cars.

Brockway Co. Announces Electric Truck Series

Vehicles Range in Capacity from 500 Lbs. to Six Tons

NEW YORK—The Brockway Motor Co. has announced its entry into the electric truck field with models that are interchangeable in parts with corresponding series in the company's gasoline truck line. Production of the electrics will center in the company's plant at Cortland, N. Y., and will be carried on by an electric truck division headed by Hugh Forman. Associated with him will be F. I. Starbuck as New York district manager, and M. B. Curtain as district manager in Chicago.

The three series of electrics comprise the following:

50-E—Drop frame type with side entrance body for frequent stop delivery service. It is described as a short, compact, quickly turned and easily parked vehicle with load accessible from the driving position. It is designed for loads of from 500 to 3000 lbs. and the battery equipment varies from 150 to 238 ampere-hours. Current consumption is from 3½ to 6½ ampere-hours per mile and the practical daily mileage range is 30 to 40.

100-E—A conventional design chassis corresponding to the Model 100 Brockway gasoline truck. Its capacity is two to three tons. Speeds of 14 to 17 m.p.h. are standard. Battery equipment varies from 270 to 375 ampere-hours and current consumption from 7 to 10 ampere-hours per mile.

170-E—A heavy duty model of conventional chassis design corresponding to the Brockway 170 gasoline truck. Its load range is three to six tons. The speed range is the same as for the 100-E. Battery equipment varies from 330 to 525 ampere-hours and current consumption from 11 to 15 ampere-hours per mile.

Cosmetic Makers Elect Willys

NEW YORK—John N. Willys, chairman of the board of Willys-Overland, Inc., and former Ambassador to Poland, has been elected to the board of directors of Affiliated Products, Inc., of Chicago, makers of cosmetic and toilet preparations.

A. P. I. Organizing Fight on Gas Tax

Will Conduct Nation-Wide Offensive on Diversion of Motor Funds from Highways

NEW YORK—A straight-from-the-shoulder hard-hitting campaign to protect the interests of the industry and the user of petroleum products from racketeering, and from a tax load beyond the ability of the average owner of an automobile to bear, is being organized by the American Petroleum Industries Committee to extend into every political subdivision in the United States. In preparation for the beginning of its second year of activity on January 1, the committee operating as a division of the American Petroleum Institute, with Baird H. Markham as director, is perfecting organization set-ups in the last of seven regions into which the nation has been divided for campaign purposes. From these regional committees organization will extend into states, counties, and communities.

Current surveys of legislative activities in states where the law-making assemblies are in extraordinary session disclose that the tendency is less to increase taxes on gasoline than it is to divert the revenues from gasoline taxation to other uses than the building and maintenance of highways. Thirty-six measures were enacted in various states during the first nine months of 1933 to divert gasoline tax revenues from highway purposes to other governmental uses. Three states enacted measures to divert gasoline revenues to school purposes. Five measures diverted such taxes for retirement of bond issues. Three measures turned gasoline revenues into the states' general fund, and one provided for payment of pensions out of gasoline revenues. In seven instances gasoline revenues were diverted to funds for the relief of needy persons, and seventeen instances of diversion were classed as miscellaneous.

New proposals are before the legislature of Illinois to turn over from gasoline revenues \$30,000,000 to be used for relief purposes, and New Jersey's legislature in adjourned sessions has been asked to appropriate \$12,000,000 of gasoline tax monies to other purposes.

Meanwhile the public is beginning to clamor for some measure of relief from intolerable conditions. Word has come from Alabama, the A. P. I. reports, that motorists and dealers are organizing in preparation for next year's political campaigns, and will serve notice on candidates for office that there must be relief from the gasoline tax which in that state amounts to 6 cents in addition to various municipal gasoline taxes, and

the federal tax of 1½ cents a gallon.

The tendency to divert gasoline tax revenues to other uses than highways has been accepted as a clear manifestation of the fact that in many states the gasoline tax rate is out of all proportion to the needs for highway uses. Admitting the needs of revenues for relief of poverty, newspapers in a good many localities are demanding that there be a reduction of the gasoline tax and adoption of some fair and equitable manner of raising funds for other purposes.

Belief is strong on the part of the members of the American Petroleum Industries Committees that the spirit of "ride a good horse until he falls" will continue rampant until all automotive users of the highways in every precinct in the nation demands that the cost of operating government be lifted from his own automobile gasoline tank.

Pierce-Arrow Near Break-Even in Third Quarter

BUFFALO—A net loss of \$17,915 after charges including depreciation, etc., of \$140,897 was sustained by the Pierce-Arrow Motor Car Co. and subsidiaries in the third quarter. This compares with loss of \$634,414 in the corresponding 1932 quarter in which the depreciation charge was \$88,312.

For the nine months ended Sept. 30, a net loss of \$272,500 is reported against loss of \$1,706,748 in the same period last year.

Fourth quarter prospects were regarded as favorable, President Chanter states, until recently when the die and tool makers' strikes in the Detroit area seriously interfered with plans for November and December with the result that fourth quarter results may prove disappointing.

Automotive Designing Skill Praised at Art-Industry Lunch as GM 25th Anniversary Medallion Is Presented

NEW YORK—"The automobile industry furnishes the most striking example of the full use of designing skill as one means of making a large and continuously responding market of satisfied buyers," said Ben Nash, products development and merchandising counselor, at a luncheon held by the National Alliance of Art and Industry in New York. The occasion was marked by presentation to Alfred H. Swayne, vice-president, General Motors Corp. of a medallion designed by Norman Bel Geddes to commemorate the 25th Anniversary of the Corporation.

"What might have become a mechanical means of transportation for a few mechanically able consumers," Mr. Nash said, "was visioned and actuated through designing ingenuity to become an integral part of almost

everyone's daily life, and through appearance and style to become a factor in reflecting social standing. The synchronization of practical imagination, engineering skill and industrial design made this a reality. Industry is now in the position where it must put design to it fullest use to compete in the new scheme for merchandising and selling."

Mr. Geddes stressed the complete latitude which had been given him in designing the commemorative medal and Mr. Swayne voiced the conviction that beauty and automobiles are complementary. In order that automobiles may have real beauty, he said, manufacturers must go to the best artists for help and pointed to the importance of the continuous work done along these lines by the General Motors art and color section recently.



G.M. Vice-president Swayne gets the 25th Anniversary Medallion from Norman Bel Geddes, who designed it



Bondholders Ask Federal Court to Remove Willys and Miller as Overland Receivers

Charge Receivership Was Not in Good Faith and Deprived Bondholders of Legal Rights—Miller Denies Reports That Plant Will Close Dec. 1

TOLEDO—Bondholders of the Willys-Overland Co., through the National City Bank, New York, trustee, in an answer filed in the Federal Court equity case this week charged that the receivership brought last February on behalf of creditors was not in good faith and has deprived bondholders of their legal rights.

They ask the discharge of John N. Willys and L. A. Miller, receivers, dismissal of the complaint, and action under their bill of foreclosure.

It is charged in the answer that suit of the Monroe Auto Equipment Co. was "a plan devised by the Willys-Overland Co. and certain of its officers, creditors and stockholders, including the plaintiff, in an effort to defeat the rights of the trustee and other creditors of the Willys-Overland Co. to pursue their usual and proper remedies at law and in equity for collection of any and all amounts owed them" by the company.

It is said that the Willys-Overland Co. in consenting to appointment of

the equity receivers violated section 17 of its mortgage agreement.

The answer charges that attorneys for the Monroe Company were in fact selected by the Willys-Overland, that certain officers and stockholders permitted the company to accrue unpaid wages knowing there would be no method of payment without a receiver, and that the trustee had been begun into withholding action on the plea that reorganization was in process.

"Neither John N. Willys, nor his representatives, nor the creditors' committee have at any time had any reason to believe that any new money in substantial or sufficient amount was or would be forthcoming for reorganization," declared the trustee.

Tracy, Chapman and Welles, law firm which represented the Willys-Overland in the equity case several years ago under which a strike was settled by Federal Court, are attorneys for the bondholders.

All attorneys have agreed to meet

next Monday in Federal Court chambers with attorney George Bryce, special master, to discuss short cuts in the litigation.

Receiver Miller has denied that the company will close Dec. 1. Operations will continue so long as there are orders, he said. Plant has 2300 employees now.

Timken Roller Bearing Earns \$970,334 in 9 Mos.

CANTON, OHIO—Timken Roller Bearing Co. earned \$970,334 after all charges in the third quarter as compared with \$929,460 in the preceding quarter and a deficit of \$444,807 in the corresponding 1932 quarter. Earnings in the first nine months of this year were \$1,623,728 against a deficit in the same period last year of \$27,286.

Assembly Line Strike Halts Nash Production

(Continued from page 623)

workers also voted to request the national labor board to send a representative to Kenosha in the hope of effecting an amicable settlement. A committee headed by Eugene Stauder was named to make formal demand that company officials recognize the union. This failing appeal is to be taken to the NRA.

The day wage minimum designated by the code, on which the company operated, was 40 cents an hour for the eight-hour day. It was changed yesterday at the request of the employees to a piece-work pay plan. The men argued that piece-work would permit distribution of work among a larger number of men. The piece-work scale was set at 4 cents a car for the operation under question, with a maximum of 70 cars a day, which made the day's wage 40 cents lower than at day work.

The men worked on the piece-work basis for one day and the following day protested that none could make as much as \$2.80 a day because the cars did not come along fast enough.

Hearing of the men's protests, Mr. Nash went to the departments and asked the men to continue under the new arrangement for several days to test the plan. The men refused and walked out.

Because the rest of the production lines depend on the assembly department moving rapidly, the company could not continue production and a hasty conference was held with Earl H. McCarty, president.

The conference resulted in the decision to close down the entire plant and a statement signed by Mr. Nash was posted throughout the factory advising that the closing order was to continue until further notice.

Johnson Says Issue Is Compliance with President's Executive Order as McCarl Rules Ford Eligible

(Continued from page 622)

taken advantage of, according to the report, to permit further study to determine whether or not Mr. Ford is fully living up to the automobile code. Even many who have taken sides with Mr. Ford in the governmental attempt to "crack down" on him by barring him from Government business think he has shown the wrong spirit in his seven-day lay-off plan, a spirit that is out of keeping with the NRA.

The position of the Government in the Ford matter was partially upheld in the McCarl ruling. For Mr. McCarl sustained the Government's contention that an automobile dealer is not entitled to Government business if the manufacturer whose product he sells is not complying with the code. But this view lost weight in the present instance by virtue of the ruling that in the absence of evidence that he was not complying with the code, Ford was entitled to Government business.

To determine whether or not Mr. Ford had in any "overt fashion" violated the code, it was disclosed that Mr. McCarl had consulted with General Johnson before making the ruling. General Johnson is said to have

stated that he knew of no violation.

But when the McCarl ruling was announced, General Johnson, then in Fort Worth, Tex., said that the Presidential order of last August requires "that they must have made affirmative agreement to comply with the code."

In further commenting at Fort Worth on the McCarl ruling, General Johnson is quoted by the Associated Press as saying:

"As far as I know, Mr. Ford is complying with the automobile code, but he has not agreed to it and Edsel told me he never would agree. That would seem to let him out as far as the President's order is concerned.

"The question involved is not one of complying with the automobile code, but of adherence to the President's regulation or violation of it. If McCarl's interpretation interferes with the President's order, it is wrong. The controller general evidently misinterpreted the executive ruling."

Without indicating what they are, the Administrator was quoted as saying that there are several questions involved in the Ford case and that they must be decided by the President.

National Shows to Have Modernistic Background

Car and Truck Space at New York All Allotted. New Rules Encourage Action Exhibits

NEW YORK—Announcement has been made by Alfred Reeves, vice-president of the Automobile Chamber of Commerce and manager of the Automobile Shows that all of the car and truck space in the New York Show has been taken. There is still, however, some space available for the exhibition of parts and accessories. This division of the show, Reeves points out, will be a much bigger attraction this year because of a decision of the management to extend invitations to jobbers and accessory dealers just as car and truck dealers have been invited to the show in the past.

A modernistic motif will form the background for the 1934 National Shows. The contract for decorating has been awarded to Samuel Asch of New York.

The fact that many manufacturers have indicated their intention to withhold the introduction of their new lines until the opening of the New York Show on January 6, and the recent announcement of Charles D. Hastings, chairman of the Show Committee, of plans to encourage the use of exhibits embodying action may be expected to stimulate interest considerably.

As was pointed out in a recent issue of *Automotive Industries*, the rules in effect this year will encourage action exhibits and the display of precision machinery and cut-out chassis. When plans have been approved by

the management chassis may be shown in elevated positions. The limit of height for demonstrating devices in the car section is 8 ft. and, in the accessory division, 7 ft. Silent motion pictures, without lecturers, may be used and radio broadcasting may be done under approved conditions.

Peed Appoints Jamerson DeSoto Advertising Head

DETROIT—L. G. Peed, general sales manager of the DeSoto Corporation, has announced the following appointments:

H. Curby Jamerson has been appointed director of advertising and sales promotion for the organization; F. L. Weithoff has been appointed assistant to the general sales manager; and Ross Williams has been given the newly created post of Plymouth supervisor for the DeSoto Division of the Chrysler Corp. T. G. McCormick of the DeSoto advertising staff, is assistant to Mr. Jamerson, the announcement stated.

Mr. Jamerson comes to DeSoto from the Aeolian Company of New York. Prior to his connection with Aeolian, he was manager of the Los Angeles branch of the Frigidaire Company and was at one time in charge of the Household Division of the Frigidaire Company at Dayton.

Report of Roosevelt-Ford Conference Is Unconfirmed

DETROIT—Reports that Henry Ford would discuss the controversy with NRA with President Roosevelt, are without any official confirmation.

Motor Buying Turns Steel Trend Upward

Outlook Is For Stable Prices as Code Changes Delay New Contracting

NEW YORK—Specifications from automotive consumers for steel needed in the initial production of new models are in a large measure responsible for this week's rise in the rate of steel mill operations to 27.1 per cent of capacity, an improvement of approximately 8 per cent over the preceding week.

Betterment in the rate at which Mahoning and Shenango valley finishing mills are operating is even more pronounced. One of the leading producer's subsidiaries is working at virtually one half of capacity. With only a few weeks intervening before buying on a representative scale by motor car manufacturers and parts makers can be counted upon to materialize, steel producers worry much less about bridging the gap than they did a fortnight ago.

The ninety-day trial period set for the steel code ends tomorrow, and a certain amount of revision, partly at the behest of the Administration and partly at that of the steel manufacturers, mainly for the purpose of clarifying certain provisions, is looked for.

Contracting for first quarter 1934 requirements, permitted by the code to begin on Dec. 1, is likely to be delayed until after code changes have been promulgated. It is well understood in the steel industry, however, that the Administration at this time sees little reason for further price advances. This, however, does not preclude the further putting up of the bars against price encroachments through practices that, while long recognized as trade customs, can be eliminated without necessitating the lifting of base prices.

A Cleveland plant is said to have booked an order for coil springs to replace the conventional semi-elliptical springs, and more business of the same sort is looked for by the trade.

Pig Iron—Automotive foundries are gradually taking in what fourth-quarter tonnage they have under contract. First quarter orders will be booked beginning with Dec. 1, and any changes in prices will have to be filed by next Monday.

Copper—The domestic price of copper continues at 8½¢, delivered Connecticut Valley.

Tin—The American automotive industries' tin bill underwent a sharp bulge when the Pound Sterling went above the \$5 level, spot Straits being quoted on Monday at 53¼¢. On Tuesday the price of tin went to 55½¢. In terms of gold, tin prices are only slightly higher than they were at the year's low, so that the American tin consumer is called upon to foot a not inconsiderable part of the cost of dollar depreciation, tin being one of the few commodities for which no domestic substitute is available. D. J. Macnaughton, representative of the International Tin Research and Development council, with headquarters at London, has arrived here and plans to spend some time in Detroit to study American manufacturing requirements.

Sales Show Normal Seasonal Drop

(Continued from page 623)

cent over the previous week. This was ten times greater than the same week of last year. Used car deliveries by De Soto dealers totaled 3081 for the week came within nine cars of breaking all records of the company.

The week ending Nov. 4 saw continued above retail sales of Terraplanes and Hudsons in the week ending Nov. 4 were 156 per cent of those for the corresponding week of 1932, and 147.6 per cent as compared with 1931.

Pontiac retail sales through October were 35,859 cars larger than in the same 10 months of 1932. During the last 10 day period of October sales were 98 per cent greater than for the same period of October last year, while the total sales for October this year were 111 per cent greater than for the same month in 1932. Total sales for the year through October represent an increase of 78 per cent over

the corresponding period of last year.

Deliveries at retail by Plymouth dealers for the week ending Nov. 4 broke all records for a week's sales in November in the history of the Plymouth Motor Corporation. During this period, 7055 new cars were delivered at retail, an increase of 24.9 per cent over the previous week and 14 times greater than the same week of last year.

Chrysler Corp. export shipments for October of 1933 were 1071 per cent over October 1932. For the year to date, shipments of passenger cars and trucks are 91.8 per cent ahead of the first ten months of 1932.

Export shipments of Terraplanes and Hudsons during the first ten months of this year are 77 per cent ahead of those for the January-October period of 1932, and are 98.7 per cent more than those for the similar period of 1931.

Chrysler Supplies Rail Car Chassis

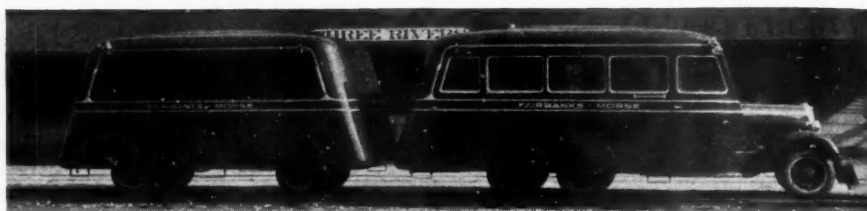
Fairbanks, Morse and Goodyear Cooperate in New Rail Car Program

DETROIT—Entry of a new factor in the rail car field is seen as the result of demonstrations in Chicago Wednesday of the first of a line of automotive rail vehicles offered by Fairbanks, Morse. The vehicles are the result of cooperation on the part of Fairbanks, Morse, supplying the flanged steel wheels, with the Chrysler Corp., supplying the chassis and the Goodyear Tire and Rubber Company supplying special tires, reputedly under the Michelin patents.

The wheels are provided with a central deep rib inside the tire to reduce the drop in the case of tire failure. The unit shown in the accompanying photograph shows a Graham bus chassis seating 14 passengers together with a baggage trailer. Bodies on this unit are by Fruehauf Trailer Co. It is estimated that these units could be sold at a price well under \$10,000 complete.

Other units which it is reported will be offered, consist of Standard Chrysler Corp. passenger cars converted with special wheels and tires for rail service. Such units would be used for inspection work on railroads.

The cars use special front axles and the steering gear, of course, has been removed.



The chassis and body for the forward unit were supplied by the Chrysler Corp. The baggage trailer body was built by Fruehauf

Labor Board Settles Four More Strikes

WASHINGTON—Four more settlements of tool and die makers strikes in the Detroit area, Senator Robert F. Wagner announced today, have been reported to the National Labor Board by the Detroit Regional Board.

Agreements covering the Murray Corporation of America, Pontiac Company, City Tool & Engineers', Inc., and Fitzsimmons Manufacturing Company were arranged, the men returning to work Nov. 9. This makes a total of 62 settlements of tool and die makers' strikes in the Detroit area.

Richberg Defends Bargaining Clause

Asserts Section 7A Affirms Worker's Right of Contract

CLEVELAND — The constitutionality of establishing wage and hour standards as emergency measures and of the collective bargaining clause of the National Industry Recovery Act, were defended by Donald Richberg, general counsel of NRA, in a speech before the local bar association. In his argument on collective bargaining, however, Mr. Richberg did not touch upon the legal reasons for prohibiting the inclusion of a statement of the rights of employers in codes of fair competition.

Mr. Richberg's discussion of collective bargaining and of wage and hour limits follows in part:

"The provisions of the much discussed section 7 (a) are merely the affirmation of a constitutional right of liberty of contract which has been in fact recently sustained by the Supreme Court when expressed in almost the same words in another federal law. But difficult legal problems have been presented to the Administration when both employer organization and labor unions have sought to transform the actual authority of the government to preserve a constitutional liberty of contract into a public power to write contracts governing labor relations. Against these pressures the NRA has steadfastly insisted upon preserving the constitutional guarantee of liberty.

"We have declined to approve of any governmental effort to write particular wages down at the request of employers, or to write such wages up at the request of employees. Agreements between employers and employees entered into as the result of bona fide collective bargaining have been approved—thus sustaining liberty of contract. The legal force of existing agreements has been recognized. It is true that the law provides for maximum hours and minimum wages; but these provisions have been written into codes either

on the basis of an agreement between those representative of the various interests involved, or as the necessary decision of a controversy submitted to the arbitration of the Administration.

"The fixing of maximum hours and minimum wages is essentially an emergency measure sanctioned by the overwhelming pressure of public opinion. It has become intolerable longer to permit millions of persons to be unemployed and millions to work at starvation wages, while business itself was being ruined and its healthy growth stopped by the unfair competition of overworked and underpaid labor. We may assume that out of the increasing integration of trades and industries, which is being promoted by code-making, we may develop business standards and means of their enforcement which will eventually make unnecessary any governmental fixing of even maximum hours and minimum wages. It seems plain that it is socially and economically desirable to avoid rigidities in the wage structures, and to avoid determining the standards of labor relations by a legislative or executive fiat.

"But in the emergency it seemed necessary to confer a limited power of regulating the basic terms of employment upon administrative agencies; and this exercise of power can be legally justified by the same principles in accordance with which rentals were regulated in a time of war, and, in a peace time emergency, the hours and wages of railroad employees were regulated by an Act of Congress."

Goosen and Plasterer Get Olds Appointments

DETROIT—C. L. McCuen, general manager of Olds Motor Works, has announced the appointment of A. E. Goosen as purchasing agent and K. C. Plasterer as chief inspector.

Mr. Goosen has been associated with the Olds Motor Works in the purchasing department since 1922. At that time he came to Oldsmobile from the Monroe Automobile Company at Indianapolis. Previous to his connection with that company he had been with Chevrolet Motor Co. He served as a buyer in the purchasing department of Olds Motor Works until 1931 when he was appointed assistant to the purchasing agent.

Mr. Plasterer has had a long experience in the automotive engineering and manufacturing field. In 1927 he came to Oldsmobile as production engineer from the Delco-Remy plant at Anderson, Ind. He served as production engineer until 1930 when he was transferred to the Muncie Products Co., a division of General Motors, as assistant to the general manager. He returned to Olds Motor Works as production engineer in May of 1932.

Mr. McCuen stated that the filling of these two important positions completes the expansion of the Oldsmobile organization.

Bethlehem Works Council Has 15-Year Record of Success

BETHLEHEM, PA. — More than 6000 complaints of workers of the Bethlehem Steel Company have been arbitrated peacefully during the 15 years the Works Council has been in existence, according to E. G. Grace, president of the company. Under the Works Council plan of employee representation, one delegate is elected for each 200 Bethlehem workers to sit in the council, which meets regularly with representatives of the management.

Of the 6000 odd cases before the Works Council of the Bethlehem company, two-thirds were decided in favor of the employees, 13 per cent were compromised, 6 per cent were withdrawn, and only 14 per cent were decided in favor of the company. About half of the cases which came before the council have dealt with working conditions and wage rates.

Timken to Establish British Axle Factory

NEW YORK—Walter F. Rockwell, vice-president of the Timken-Detroit Axle Co., on returning from Europe Nov. 9, announced that his company would begin work immediately on a project to establish an axle plant in England, to supply British and Continental motor-vehicle manufacturers. Hitherto the company has been represented in England by an agency.

While in Europe, Mr. Rockwell visited England, France, Italy and Germany. He was favorably impressed by present and contemplated expansion by British motor-vehicle manufacturers. He pointed out that while nationalistic buying propaganda remains at its present tensiety and until the international monetary scheme is more stable, American manufacturers wishing to get a large quantity of European business would probably have to establish more European plants.

In the plant to be established Timken plans to supply axles and drive units, principally for heavy-duty trucks, including six-wheelers.

Staupe Grants License

CHICAGO — Patent Engineering Corp. of this city has been granted exclusive licenses on 18 patents and patent applications on certain types of power operated brakes and clutches, by E. G. Staupe, president of the E. G. Staupe Mfg. Co., St. Paul. Patent Engineering also controls the Rockwell patents.

Kelsey Hayes in Black

DETROIT — Kelsey-Hayes Wheel Co. report a net profit of \$67,194 in the September quarter contrasted with a loss of \$653,414 for the corresponding 1932 period. For the first nine months, the company's net loss was \$234,982 against a net loss of \$1,781,710 in the first three quarters of last year.

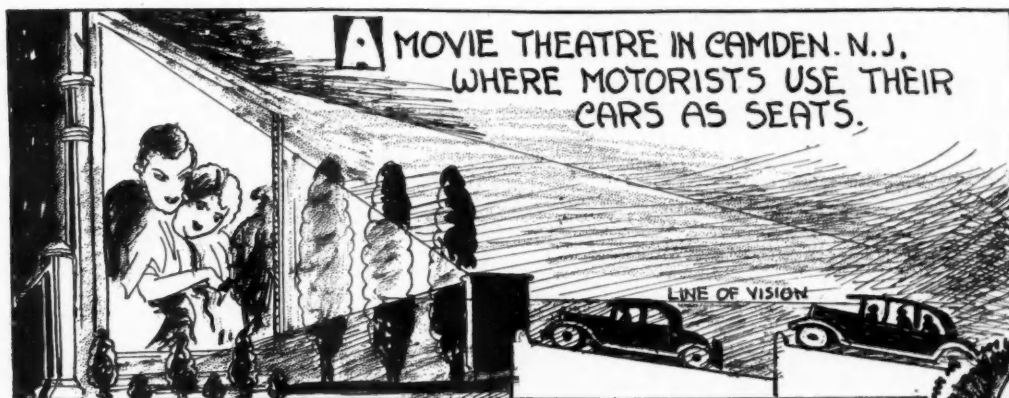
Industrial Truck Tire Revision Is Proposed

WASHINGTON—A proposed revision of Simplified Recommendation R103-29, covering industrial truck tires, has been mailed to all interests in the industry for their consideration and written approval by the Division of Simplified Practice, Bureau of Standards. The revised recommendation, which was drafted by the industry's standing committee, reduces the 30 sizes held as standard in the 1929 program, to 19. Four new sizes have been added, making a total of 23. This new program also covers sizes of tires for trailers.

The revised schedules will become effective one month after the announcement by the Department of Commerce that the required degree of support has been received and then will be promulgated as Simplified Practice Recommendation R103-33—Industrial Truck and Trailer Solid Tires.

Automotive Oddities—By Pete Keenan

Write us if you know an Oddity



CHAS. MILLER HAS LIVED AND TRAVELED IN THIS "AUTO HOME" FOR THE LAST THREE YEARS.



A SIGN NEAR THE TOWN OF "12 MILE" Cass Co. Ind.



Fisher Offers \$51,000 in Guild Scholarships

Number of Prizes Increased from 6 to 24—New Rules to Govern Competition in 1934

DETROIT — The Fisher Body Craftsman's Guild will offer a greatly increased number of scholarship awards in its fourth annual competition. Twenty-four university scholarships with an aggregate value of \$51,000 will be awarded in the 1933-34 competition. Only six were offered this year, although seven were awarded because of a tie between two Canadian entrants.

While the general form of the competition remains the same, with the construction of a replica of the Fisher emblems as the project, the changes in operation will tend to make entries more selective and to give secondary school authorities, particularly those directly in contact with entrants, greater influence in the actual competition.

Each individual application must be endorsed by the entrant's school superintendent or principal, by his manual arts teacher or similar boys' activities leader, and by his parent or guardian.

All state lines are abolished in the competition, with the provision that sixteen of the twenty-four scholarships will go to boys in the United States and the remaining eight to Canadian youths. All coaches will be judged in Detroit or Toronto, and all will be eligible for national judging, in contrast to last year's rules which hold that only state winners were eligible for the main scholarship awards.

The inter-school competition and plaque awards, so successful in the past, will be continued.

The twenty-four university scholarships will be divided into six of \$5,000 each; six of \$2,000 each; six of \$1,000 each and six of \$500 each. As in the past, the entire amount goes to the education of successful entrants at any accredited university.

Russia and Curtiss-Wright In Plane Engine Deal

NEW YORK—The *Herald Tribune* says negotiations for the establishment of an American-supervised aircraft engine plant in Soviet Russia have been completed between representatives of the Soviet and Curtiss-Wright Corporation.

The project, which has the approval of the United States Army and Navy, the newspaper says, involves a new five-year military and commercial aviation expansion program, which is said to be a part of Moscow's answer to a growing Japanese menace at her eastern boundaries.

The project is expected to bring approximately \$1,000,000 annually in

new business to the American aviation industry.

The plant in Russia would produce Cyclone and other Wright motors under a foreign licensing agreement, the newspaper says, adding that permission of the army and navy was necessary because these services hold an exclusive option on types they do not wish to see fall in the hands of other nations.

Under this arrangement the Russian government is to be provided with working drawings and details of the manufacturing processes, as well as the training of inspectors and factory personnel at the Paterson plant.

Mack Reduces Loss

NEW YORK—Mack Trucks, Inc., reports for the quarter ended Sept. 30, a net loss of \$85,101 after depreciation amounting to \$161,382. This compares with a net loss of \$115,202 in the preceding quarter, and a net loss of \$444,834 in the September quarter of 1932. The net loss for 9 months ended Sept. 30 was \$567,211 after depreciation amounting to \$443,294. This compares with a net loss of \$961,776 in 1932.

Reynolds Earns \$101,720

DETROIT—A net profit after charges but before taxes of \$101,720 is reported by Reynolds Spring Co. for the first nine months of this year, against a loss of \$136,523 in the corresponding months of 1932.

War Department O.K.'s Size-Weight Limits

WASHINGTON—The War Department has put its stamp of approval on the size-weight limitations approved by the American Association of State Highway Officials. The Department of Agriculture recently submitted these limitations to the chief of staff and the Acting Secretary of War, who replied as follows:

"Highways designed to safely carry vehicles of the weights and sizes provided in the recommended code, it is believed, will be adequate for the War Department needs in time of war or national emergency. In the opinion of the War Department, proper provision would not be made for the national defense if our major highways were designed for vehicles of smaller dimensions and weight."

"This definite statement as to the War Department's requirements for the necessities of national defense," Roy F. Britton, director of the National Highway Users Conference, says, "should put a stop to the efforts to reduce size and weight limitations in state legislation below the standards fixed by the highway builders themselves."

Olds Appoints Cupper

DETROIT—H. J. Cupper has been appointed Southern regional sales manager for Olds with headquarters at Memphis. He was formerly Atlanta regional manager for BOP.

CALENDAR OF COMING EVENTS

SHOWS

English Motorcycle & Cycle Show, Olympia	Nov. 25-Dec. 2
New York, Automobile Show....	Jan. 6-13
Toronto, Ont., Automobile Show,	Jan. 13-20
Milwaukee, Wis., Automobile Show,	Jan. 13-20
Newark, N. J., Automobile Show,	Jan. 13-20
Cleveland, Ohio, Automobile Show,	Jan. 13-20
Cincinnati, Ohio, Automobile Show,	Jan. 14-20
Philadelphia, Pa., Automobile Show,	Jan. 15-20
Brooklyn, N. Y., Automobile Show,	Jan. 15-20
Detroit, Mich., Automobile Show,	Jan. 20-27
Hartford, Conn., Automobile Show,	Jan. 20-27
Baltimore, Md., Automobile Show,	Jan. 20-27
Boston, Mass., Automobile Show,	Jan. 20-27
San Francisco, Calif., Automobile Show	Jan. 20-27
Chicago Automobile Show,	Jan. 27-Feb. 3
Washington, D. C., Automobile Show	Jan. 27-Feb. 3
Camden, N. J., Automobile Show,	Feb. 3-10
Los Angeles, Automobile Show..	Feb. 3-11

Rapid City, S. D., Automobile Show	Feb. 7-10
Springfield, Ill., Automobile Show,	Feb. 8-10
Kansas City, Mo., Automobile Show,	Feb. 10-17
Black Hills, S. D., Automobile Show	Feb. 15-17
Evansville, Ind., Automobile Show,	Feb. 20-24
Denver, Colo., Automobile Show,	Feb. 20-28

CONVENTION AND SHOW

Natl. Assoc. of Engine and Boat Mfrs., New York City	Jan. 19-27
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CONVENTIONS

International Power & Engineering Conference, New York City....	Dec. 3-8
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MEETINGS

Perdue University, Welding Meeting, Lafayette, Ind.	Dec. 7-8
Natl. Automobile Dealers Assoc. Meeting, New York City	Jan. 8
Rubber Assoc. Meeting and Banquet, New York.....	Jan. 8
S.A.E. Annual Dinner, New York....	Jan. 8
Motorcycle & Allied Trades Assoc. Annual Meeting, New York....	Jan. 10
S.A.E. Annual Meeting, Detroit....	Jan. 22-25

CONFERENCE

Lafayette, Indiana, Welding Conference (Auspices of Purdue University)	Dec. 7-8
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